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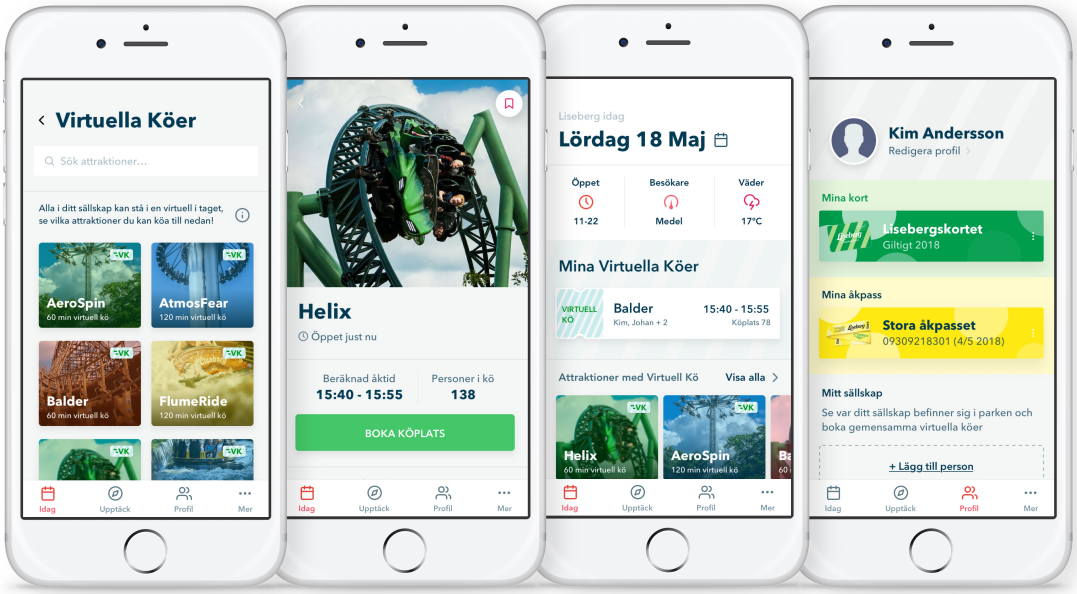

Virtual Queuing

Designing a service addressing queuing problems at an amusement park

Master's thesis in Interaction Design and Technologies

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Gothenburg, Sweden 2018

Master's thesis 2018

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Cover: Personal picture of the *Virtual queuing* prototype.

Typeset in LaTeX
Gothenburg, Sweden 2018

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Abstract

Extensive waiting time at amusement parks has proven to be one of the most negative factors for the guest experience. This master thesis project aims to study how the user experience of queuing at amusement parks can be improved through becoming more meaningful, pleasurable or efficient. The amusement park *Liseberg* in Gothenburg, Sweden, is the focus of the thesis project, alongside a *Virtual queuing* service. The project is conducted in collaboration with *Liseberg AB* and *The Techno Creatives*.

A thorough design process has been applied to this project. Initially, several research methods and data analysis tools were used to identify problem areas within the amusement park domain. Subsequently, an ideation phase was conducted to develop potential solutions to the identified problem areas. Finally, a *Virtual queuing* service was prototyped, evaluated, and improved through an iterative process.

Utilizing a *Research through design* approach, the project produced two results: a set of recommendations highlighting factors to consider when designing a virtual queuing service for amusement parks, and a prototype of a *Virtual queuing* service applied at *Liseberg*.

Keywords: virtual queues, amusement park, experience-centric service, queuing system, Liseberg, ride attractions, waiting time, user experience, service design.

Preface

This report presents a master thesis project of 30 ECTS credits, conducted between January 2018 and June 2018. The authors are two students of the master's programme Interaction Design and Technologies at the division of Interaction Design, department of Computer Science and Engineering at Chalmers University of Technology. The thesis was performed in collaboration with *The Techno Creatives* and *Liseberg AB*.

Throughout the project, we have received support and guidance that have been of great value and importance both to our personal experience of conducting the thesis project, but also to the project outcome. We would like to express our gratitude towards the employees of *The Techno Creatives* for welcoming us to your company, along with your support, great input and limitless access to your high-quality coffee. We would like to extend a special thanks to Noel Braganza, our main company contact and supervisor, for great support and feedback throughout the whole design process.

Further, we would like to thank all the interview- and test participants for taking the time to participate in our research, and sharing your valuable thoughts and opinions with us. Furthermore, we would like to express our gratefulness towards *Liseberg's* management team and their expert input, with a special thanks to Johan Ottosson. Thanks for all the great ideas, for all the guidance and for trusting us and our process throughout the project.

Additionally, we would like to thank our examiner Staffan Björk, at the department of Computer Science and Engineering at Chalmers, for great feedback and clarifications. Lastly, we would like to thank our supervisor Sofia Serholt, also at the department of Computer Science and Engineering at Chalmers, for steering us on in the right direction, challenging us and giving valuable input throughout the entire project.

Felix Franzén and Helena Stening, Gothenburg, June 2018.

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1
Introduction

Amusement and theme parks is a global, growing, industry that attracts hundreds of millions of visitors every year (TEA & AECOM, 2015). These parks provide a thrilling and exciting experience where visitors can ride a multitude of attractions and have new immersing experiences. However, this is often hindered by extensive queuing times (Barnes, 2010). This is primarily a problem when visitors try to ride the different attractions. Waiting times, depending on the season, can range from a couple of minutes to several hours for the most popular rides. Consequently, the average visitor rarely has time to experience more than a handful of attractions during their visit. Thus, making the time spent waiting more pleasurable is an important goal in order to improve visitors' satisfaction and perception of the amusement park service (Davis and Heineke, 1998). The amusement park industry has previously tried to tackle queuing problems using various solutions. Some use operational tactics that reduce actual waiting times, and others try to influence visitors' perception of waiting time.

1.1 Business stakeholders

This thesis has been written following a design project done in collaboration with two external business stakeholders, *Liseberg*, and *The Techno Creatives*. *Liseberg* is Sweden's most visited amusement park. *The Techno Creatives* is a product development firm based in Gothenburg, developing solutions for the automotive-, transportation-, financial-, and medical industries. *Liseberg* and *The Techno Creatives* have previously collaborated in the creation of a virtual reality experience for a new roller coaster, *Valkyria* (The Techno Creatives, n.d.). Furthermore, the guests of *Liseberg* were also regarded as a stakeholders in this thesis project, since they were the focus point of the research, and also the group most affected by the project outcome.

1.2 Aim

The aim of this project is two-fold. The first aim has been to explore how the user experience of queuing at amusement parks, in general and specifically at *Liseberg*, can be improved through becoming more meaningful, pleasurable or efficient. The general experience of queuing at amusement parks has been explored to generate a holistic understanding of the problems, opportunities and factors influencing guests' and employees' experiences. The second aim has been to develop a solution based on insights acquired by exploring the domain, along with a high-fidelity prototype.

Following a number of design activities, the solution chosen was that of virtual queuing. This means that the research question, initially focusing on exploring general important factors of developing solutions to improve the user experience while queuing, has been adapted to fit the specific solution chosen in the project. It is important to note that the selected solution only represents one specific way of approaching the domain, hence only solves a subset of the identified problems. Lastly, the project's purpose has also been to develop a high-fidelity prototype of the solution, intended to be communicated to the project's stakeholders.

1.3 Research question

The research question that was created and explored in this project is:

"What factors are important to consider when designing a virtual queuing service in order to improve the user experience of queuing at an amusement park?"

1.4 Delimitations

- This thesis project focuses mainly on amusement parks. However, there is a possibility that initial research regarding waiting time and queuing may be conducted in other experience-centric services.
- This thesis project focuses on queuing systems. Other parts of experiences related to amusement parks will not be considered unless they affect the queuing system in any way.
- This thesis projects research and result is limited to the domain of interaction- and service design. Solutions related to areas such as business, marketing and logistics will not be focused on.

1.5 Disposition

This project report is structured chronologically and describes the phases of the thesis work in their order of occurrence. It aims to guide the readers through the project and create an understanding of the applied methods and the decision making, leading towards the project results. The report is divided into the following chapters:

1. Introduction. This chapter introduces the thesis project and its aim, project deliverables and a brief background together with the research question.

2. Background. In this chapter, the reader is presented with background information regarding the domains of amusement parks and queuing together with existing solutions and previous work.

3. Theory. Described in this chapter are the different theories and models relevant for creating an understanding of the project domain. Also, an introduction to pre-

vious research can be found here.

4. Methods. In this chapter, different design approaches and methods used in the project for research, ideation, prototyping and evaluation are described.

5. Planning. Here, information regarding when and how to apply the different methods of the previous chapter is presented.

6. Process. Described in this chapter is the complete project process, including the pre-study, user research, stakeholder research, synthesizing conducted research and ideation together with multiple concept development phases and evaluation phases.

7. Results. In this chapter, the reader is presented with the project results.

8. Discussion. The project, the methodologies, the process of applying the methods and the results are discussed within this chapter.

9. Conclusion. This chapter aims to answer the research question and summarize the results of the project work and the project members conclusions about the subject.

Bibliography. Presents a list of the sources referenced throughout the report.

Appendices. In the last section, appendices such as interview scripts, initial concepts and other research is presented.

2
Background

This chapter introduces background information regarding the problem domain; amusement parks and queuing experiences. Also, it presents common solutions of queuing systems in amusement parks that are used today.

2.1 Amusement parks

"Amusement park", or "theme park", is defined as “a large permanent area for public entertainment, with entertaining activities and big machines to ride on or play games on, restaurants, etc., sometimes all connected with a single subject” (Cambridge University Press, 2018a). In recent years, the global attendance for the 25 biggest amusement- and theme parks has steadily increased by approximately 4 - 5.5% every year. The top 20 parks in Europe, Middle East and Africa (EMEA) have experienced positive growth as well. Sweden’s biggest amusement park, *Liseberg*, has continuously kept a seventh-place spot among the top 20 biggest parks in EMEA, also showing a positive growth in attendance (TEA & AECOM, 2013, 2014, 2015, 2016). Amusement parks are hedonic services, meaning that they focus primarily on satisfying guests’ self-fulfillment values and being pleasurable to experience, rather than providing utilitarian benefits (Heijden, 2004).

2.1.1 Liseberg

The target domain of this thesis is *Liseberg*, an amusement park located in Gothenburg, Sweden. *Liseberg* opened in 1923 and is today Sweden’s most visited tourist attraction, hosting over 3 million visitors each year (Liseberg, 2017). As of 2018, the amusement park has 42 ride- and experience attractions together with games, dance courts and restaurants. The attractions cover various target groups, from the playgrounds *Kaninlandet* (The Bunny Land) and *Barnens Paradis* (Childrens’ Paradise) for young children, to challenging attractions such as *AtmosFear* and *Helix*. The amusement park has its peak season during summer, but also hosts a market during Christmas and Halloween (Liseberg, 2017).

2.2 Queuing

Queuing is a phenomena appearing when people await their turn to be attended or processed (Oxford Dictionary, 2018), often in a line or sequence waiting for something (Cambridge University Press, 2018b). Lines can take different forms depending

on what system is used, culture, queuing area or behaviour of people participating. Some of the established queuing forms are *Structured lines*; leading to one or multiple servers, *Number assignment systems*; where arriving costumers receive a number or *Targeted admission times*; where reservations are made prior to arrival (Norman, 2008)

Although shorter waiting time is often desired, there are contexts in which appropriate waiting is something to strive for. A customer survey at an amusement park revealed that low waiting times had a negative impact on customer satisfaction. Results from another survey indicated that as long as the number of rides a visitor had time to experience is higher than a certain threshold, additional rides provided a low improvement in customer satisfaction (Ahmadi, 1997).

2.3 Existing solutions and previous work

Several amusement parks have deployed products, services and strategies to combat excessive waiting times at their facilities. Some examples of these are presented below.

2.3.1 Reducing queue length

There have been efforts by amusement parks to shorten waiting times by providing guests with the possibility to skip long lines. One popular way to do this is to give guests the ability to use a secondary fast lane that bypass the ordinary queue. Such systems have been implemented at *Disney* resorts with the *Disney FastPass+* and at *Liseberg* with the *Express-Pass*. The *Disney FastPass+* (Disney, n.d.) is included in the theme park's admission, and allow the guests to select one to three experiences they would like to visit. The guests are given a time slot when they gain access to the experience's *FastPass+* lane. An identical approach is provided by the *Liseberg Express-Pass* (Liseberg, 2018a), where customers who purchase ride admission online, before their visit, are able to book *Express-Pass* on three roller coasters, by pre-selecting time slots during their purchase.

2.3.2 Virtual queuing

Amusement parks around the world have introduced various digital queuing management systems, allowing visitors to stand in virtual queues. The theme park *Legoland Windsor* has since 2008 used a system allowing guests to digitally stand in line for some rides, while spending time in other parts of the park. The guests use a specific ride reservation device or a mobile application for this feature (Legoland UK, 2018). *Universal Orlando* introduced a new virtual queuing system early 2017, called *TapuTapu*, where guests receive a wristband to tap on certain stations placed outside the attractions. Tapping into this station would place the guest in a virtual queue, notifying them when it is time to return to the attraction for the ride (Niels, 2017). This types of solutions free the guests from standing in a physical queue and allow them to visit other parts of the park, enjoying other attractions or activities.

2.3.3 Making waiting meaningful

Distracting the visitor can be an effective way to reduce the perceived time spent queuing (Maister, 1984; Norman, 2008). When *Liseberg* opened their new roller coaster *Helix* in 2014, they expected extensive queue times. In order to entertain guests and provide them with a pleasant queuing experience, they turned to gamification. *The Helix Game* (Byström, 2015; Liseberg, 2018b) is an *iOS*- and *Android* smartphone application that allows guests in the queue to *Helix* to compete with each other in short mini-games. *The Helix game* is centered around short game rounds. Every 15 minutes a code is presented on monitors situated around the queue area. By entering the code into the application, the guests join the current round. Players play a series of 5 randomized mini-games (out of 10 total), each 12 seconds long, and try to collect as many points as possible. At the end of the game round, the player with the most points in one series is awarded the win (Byström, 2015). As an added bonus, the winner earns an *Express-Pass* (Liseberg, 2018a) they can use to skip the line the next time they ride the attraction. The app also provides visitors with the ability to register their rides with *Helix* in order to win achievements (Liseberg, 2018b). *The Helix Game* was perceived as a success, with 1.7 million game rounds being played as of October 2015 (Byström, 2015). Disney has also used video games to entertain people stuck in queues. Barnes (2010) describes how one of Disney's attractions, *Space Mountain*, has a large number of stations that keep guests distracted with simple games. Players are challenged to complete different tasks, such as clearing a runway of asteroids.

3
Theory

This chapter presents theories and models relevant to this thesis, specifically theories of experiences and experience-centric services. Also, this chapter presents research around the domain of waiting times and virtual queuing.

3.1 User experience

Norman and Nielsen (2018) summarize that the user experience (UX) is a person's complete interaction with a company, and its service and products. A more detailed description is provided by Hartson and Pyla (2016, p. 16), who suggest that the scope of UX encompasses:

- effects experienced due to usability factors.
- effects experienced due to usefulness factors.
- effects experienced due to emotional impact factors.

A product or service with an excellent user experience meets the needs of its end-user, is perceived as meaningful, memorable and provides positive emotions on use (Norman and Nielsen, 2018; Hartson and Pyla, 2016). It is important to consider that the experience ultimately is a result of more than the product or service itself. Branding, and the values and identity of the company that provides the product or service, influence the user's perception and subsequent experience (Hartson and Pyla, 2016).

It can be argued whether an experience can be purposely designed. An experience is always subjective to the individual having it. A designer can try to create an experience by shaping the presentation and behavior of a design (Cooper, 2014), but the final experience is a product of an individual's personal, subjective, interaction with a design in a particular context (Hartson and Pyla, 2016).

3.2 Designing for experiences

In order to create a high-quality user experience, a designer should consider what, why and how products and services evoke emotions (Jordan, 2005; Norman, 2004). Below, three models are presented. Each highlights different relationships between emotions and products and services, important to consider when designing experiences.

3.2.1 Jordan's four pleasures

Traditionally, the field of Human Factors has primarily concerned itself with making products easier to use through an improvement of usability factors (Jordan, 2005). Jordan (2005) argues that it is problematic that the usability centered approach ignores the complex user-product relationship that exists in real-life, and only views products as tools used to accomplish tasks.

Based on this viewpoint, Jordan (2005) suggest that a pleasure-based approach can inspire a more holistic view of the user and their relationship to a product. Using this approach, a design can be judged on features other than performance and ability to facilitate task completion. In the context of products, "pleasure" is described as the "emotional, hedonic and practical benefits associated with products" (Jordan, 2005, p. 11). Jordan presents a "four pleasure"-framework, a contextualization of the four pleasure model proposed by Lionel Tiger into the realm of product design. The framework's intention is to be a tool used by designers to approach experience design in a systematic way. Below, the four pleasures presented and exemplified by Jordan (2005) are described.

Physio pleasures
Physio pleasures are a set of pleasures derived from a person's sensory organs and feelings of sensual pleasure. Designing for physio pleasures entails considerations of the product's visual, auditory, haptic and olfactory properties. For example, the smell of a new piece of furniture influences how pleasurable the user perceives it to be.

Socio pleasures
Socio pleasures are elicited from relationships with friends, family, and society as a whole. Products are judged and valued according to their ability to avoid discomfort in these relationships and how well they facilitate social interaction. For example, products can be a reason for social gatherings, be talking points, or indicate to others that the user is a member of a particular social group.

Psycho pleasures
Psycho pleasures refer to people's emotional and cognitive reactions to a specific product. Psycho pleasures concern a product's cognitive demands and the emotional reactions elicited when experiencing it. An important factor is the product's ability to enable task completion. Jordan (2005) highlights that a product's usability affects its perceived psycho pleasure.

Ideo pleasures
Ideo pleasures are related to the identity, values, and beliefs a product exhibit. As an example, Jordan (2005) describes that a product made from biodegradable material embodies environmentally friendly values, which can make the product generate positive ideo-pleasure if the person using it is concerned with sustainability and the environment.

3.2.2 Desmet's multilayered model of product emotions

Desmet presents a theoretical basis and conceptual model for the process behind the emotional responses a user has when experiencing a product (Desmet and Hekkert, 2002; Desmet, 2003). The model's theoretical background is the cognitive, functional, view of emotions, which suggest that all emotional responses are a consequence of an individual's appraisal of a situation. Emotions are the result of an assessment of whether a situation is harmful or beneficial for the individual. It is the individual's perceived meaning of an event that is responsible for the resulting emotion (Desmet, 2003). An overview of the model is visualized in figure 3.1. *Concern* refers to the users and their goals, attitudes (what they like or dislike) and standards (how they expect the world to be and people to act). *Product* represents the product as an object (the product as such), agent (its potential to cause or contribute to an event) or event (referencing past events as well as future ownership or use of the product). When experiencing a product, the user creates an appraisal of how beneficial or harmful the product is to their concern, which in turn results in surprise-, instrumental-, aesthetic-, social- or interest emotions (Desmet, 2003).

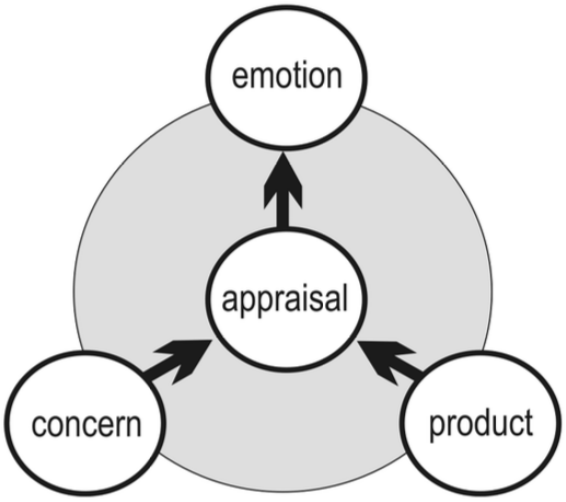


Figure 3.1: Overview of the main components included in Desmet's multilayered model of product emotions (Desmet, 2003, p. 5)

3.2.3 Norman's emotional design

In the book "Emotional Design", Norman (2004) suggests that affect plays an important role in a person's perception of a product. Products that generate positive emotions are perceived as easier to use, and mistakes are more easily forgotten (Norman, 2004).

Norman continues by presenting a cognitive and emotional system that describes different levels of processing in the brain. It consists of three levels, *visceral*, *behavioral*, *reflective*. These guide our thoughts and behavior by competing, cooperating and modulating each other. In turn, they help form negative and positive effects. The levels are briefly summarized below. The *visceral* level regards processes that

make rapid, pre-thought assessments of sensory information. The *behavioral* level relates to processes that control behavior. Finally, the *reflective* level concerns reflection, contemplation and self-identity. This system poses some implications for design, as a person's perception of a product is created by experiencing it on all three levels simultaneously. Norman describes the relationship between products and the three levels through a set of design requirements. As the *visceral* level considers evaluations of sensory information, designing for this levels relates to a product's physical characteristics and its first impression. The *behavioral* level concerns usage of a product, particularly performance and usability. *Reflective* design is about ...the rationalization and intellectualization of a product" (Norman, 2004, p. 5). It requires considerations about the personal meaning we attribute to the product, the memories it evokes, and how it communicates our self-image to other people.

3.3 Experience-centric services

An *experience-centric* service is defined as a service where the customer experience is at the core of the business offer, designed proactively in order to develop original services (Voss, Roth and Chase, 2008). Services with the user experience in focus are often characterized by creating emotional, memorable and personal connections with the customers, by building appealing, involving and immersive environments (Pullman and Gross 2004).

Hedonic user experience is described in a similar way, focusing on pleasure, enjoyment, excitement, and fun through the use of technologies (Stelmaszewska, Fields and Blandford, 2004). It is argued to be part of the traditional principles of usability as a shift in focus is stressing other aspects of user experience than merely goal-directed activities or instrumental experiences.

Zomerdijk and Voss (2010) developed six propositions to use in experience-centric services: The design of experience-centric services involves:

1. Designing a series of service encounters and cues.
2. Sensory design.
3. Requiring front-line employees to engage with customers.
4. Paying attention to the dramatic structure of events.
5. Managing the presence of fellow customers.
6. Closely coupling backstage employees to the front stage experience.

3.4 Waiting times

First impressions help customers form expectations of a service, and subsequently color their perception of it (Davis and Heineke, 1998; Maister, 1984). Waiting and queuing is often one of the first activities for a visitor interacting with a service. Thus, it is an important aspect to consider this experience in order to provide customer satisfaction (Davis and Heineke, 1994; Davis and Heineke, 1998). Service

providers can try to increase satisfaction by either improving the performance of the service to decrease actual waiting time or by manipulating customers' perceived waiting time (Davis and Heineke, 1994).

Previous research indicates that perceived waiting time is an important factor that influences satisfaction (Davis and Heineke, 1998). Note that the perceived time can be different than the actual, objective, time. Customers' expectations, state of mind, and the context of the waiting can affect time perception (Davis and Heineke, 1998; Tom and Lucey, 1997). Furthermore, the actual waiting time is often overestimated; people believe that they wait longer than they actually do (Tom and Lucey, 1997).

Katz et. al. (1991) studied how customers at a bank perceived waiting under different conditions. The study found a correlation between an increase in perceived waiting time and a decrease in customer satisfaction. The results also suggest that distractions increase customer satisfaction by making the waiting more interesting, although the distraction had no effect on perceived waiting time. Similar results were found by Tom and Lucey (1997), who found that a decreased perceived waiting time increased the customers' satisfaction with personnel at a supermarket. However, an increase in perceived waiting time did not influence the customers' satisfaction with the supermarket itself. The authors suggest that the personnel and supermarket might be regarded as two separate entities by customers.

3.4.1 Norman's principles of waiting lines

Norman (2008) presents a series of principles for waiting lines. They build upon guidelines previously presented by Maister (1984) but are updated in light of modern research. By adopting these, the waiting experience can become more pleasurable. A summary of the eight principles, as described by Norman (2008), are described below.

Emotions dominate. The emotions people experience while waiting influence the experience itself, as well as how it is remembered afterward. Positive moods make people more forgiving and able to accept the service's shortcomings.

Eliminate confusion: provide a conceptual model, feedback and explanation. The waiting lines and its surrounding environment should provide clear information that guides queuing behavior. "Where do you start?", "how long will it take?" and "what is to be expected?" are some of the questions that should be easy to answer. It is essential to reduce feelings of uncertainty since it might create negative emotions. Visitors should be thoroughly informed and receive feedback when their waiting time changes.

The wait must be appropriate. People should know why they endure waiting, agree that the wait cannot be avoided, and understand the cause of its duration. The conceptual model presented in the previous principle is important since it will help

people to understand the underlying processes dictating their waiting time.

Set expectations, then meet or exceed them. It is important to manage people's expectations to create a pleasant waiting experience. The service should give people information and feedback to make sure their expectations are grounded in reality. If an estimate of waiting time is provided, Norman (2008) describes that it is beneficial to communicate the upper bound of the estimate to give people a positive surprise if it is met or exceeded.

Keep people occupied: filled time passes more quickly than unfilled time. Context affects the perceived time and distance of waiting. Time consisting of events are perceived as passing quicker than time without events. However, the inverse is true when remembering a previous experience of waiting. The same effect is also similar in relation to distance, where filled space is perceived as longer than an unfilled space.

Be fair. Strong negative emotions might be triggered if the waiting is perceived as unfair. If other people have, or force themselves into, an unfair advantage, the negative emotional state can be more detrimental to the waiting experience than having to wait for a longer time than expected.

End strong, start strong. The serial position effect indicates that the start and end of an experience are the most important in determining how it is remembered. The start helps set expectations influencing the entire experience, and the end is the part most easily remembered.

Memory of an event is more important than the experience. Since the recollection of previous experiences control people's future behavior, it is crucial to make sure that the experience is remembered as positive.

Norman (2008) continues by providing examples of design solutions that help alleviate the problem with waiting. Apart from creating more optimal queuing systems, designing for the eight principle (Memory of an event is more important than the experience), can often be beneficial. Creating positive events in the queue, such as a Disney character appearing in the queue at Disney Theme parks, can make visitors remember their visit more fondly. The positive memory of the character will be remembered to a greater detail than the long waiting time. Furthermore, by making sure that the events at the end of the queue are positive, the visitor is more likely to feel the waiting time being worth the effort of queuing. The experience of waiting can also be manipulated using distractions, such as providing guests access to magazines or televisions to occupy their time.

3.5 Virtual queuing

In order to free up amusement park guests from physically standing in lines, *Universal Orlando* did a test release of a virtual queuing system, *TapuTapu*, for some of their ride attractions (Niels, 2017). Park guests could tap their wristbands on

physical installations in order to claim a virtual queuing spot. The system had several implications, which Niels (2017) argues will be problems other amusement parks will face, when implementing virtual queuing systems. In the specific case of the *TapuTapu* release, the virtual queues became long, reaching up to six hours, while guests were not able to join other queues requiring the use of their *TapuTapu* wristbands as they waited in virtual queues.

Niels (2017) express the need for real-time ride capacity data in order to successfully allocate virtual queuing spots to attractions. Additionally, he expresses the need for clear communication regarding waiting times for both physical queues and virtual queues. Lastly, he mentions the importance of guiding the guest in understanding the commitment of attending a virtual queue, as in this case the guests were not able to queue for many of the other attractions, virtually or physically, when attending one virtual queue.

Lemaster (2015) studied guest attitude towards virtual queues and other line bypassing systems. Among the researched parks, it became clear that there was commonly a low participation of guests using the provided systems, as there was only one park where the majority of the guests utilized the system. The main reasons, according to Lemaster (2015), was that guests either did not want to pay extra for accessing the service or did not know about its existence. Additionally, he underlines the issues of guests not knowing how to fully utilize the provided bypass systems and the lack of flexibility in time attendance once a guest join a virtual queue.

A study regarding how virtual queuing systems and other bypassing line systems at amusement parks affected the guest satisfaction and perceived fairness was made by Lutz (2007). Through a survey-based research, she came to the conclusion that guests utilizing such systems express a satisfaction increase, compared to the guests not using the system. Also, it became clear that the perceived fairness decreased for the guests waiting in the physical line compared to the guests utilizing the system.

4
Methods

This chapter describes different design process approaches, as well as methods used for research, ideation, prototyping, and evaluation. The order and application of the processes and methods in this thesis is presented in Chapter 5

4.1 Design approaches

In this section, several design approaches such as *Wicked problems*, *Research through design*, *Human-centered design*, *Goal-directed design* and *Service design* are described. The approaches described are combined and used throughout the project, either fully or partially, depending on the project needs.

4.1.1 Wicked problems

Wicked problems are a "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (C.W. Churchman, 1967, p. B-141). Buchanan (1992) discusses wicked problems and their relation to design thinking. He highlights that while the linear design approach, consisting of the phases "problem definition" and subsequent "problem solution", is based on determinate problems, the wicked-problems approach requires reasoning about problem indeterminacy. Subsequently, Buchanan (1992) describes that the concept of indeterminacy suggests that design problems, in reality, have no definitive limits or conditions, since they can be related to any area of human experience.

4.1.2 Research through design

Research through design is the practice of researching design through the use of practical design activities (Fallman, 2008; Gaver, 2012). Fallman (2008) describes that the researcher is involved in an active design process with a clear design research question in mind, rather than being an outside observer.

Gaver (2012) presents and answers to criticism of the practice. For example, critique brought forth by Forlizzi et al. (2011), and Zimmerman, Stolterman, and Forlizzi (2010). These authors argue that it is problematic that the process lacks rigor and clear measurements of successful outcomes (Forlizzi et al. 2011; Zimmerman,

Stolterman and Forlizzi, 2010). They suggest that protocols, documentation, and guidelines should be created in order to develop research through design into a valid process that can produce rigorous theory (Zimmerman, Stolterman and Forlizzi, 2010). Furthermore, design researchers should be able to justify the use of process rather than using it solely due to familiarity (Zimmerman, Stolterman and Forlizzi, 2010). However, Gaver (2012) suggests that convergence and increased agreement through standardization could be, what would be contradicting to other sciences, limiting. He also suggests that design research should not only build on other's result and a shared knowledge base, but also rebut, develop variations or create completely new structures and processes.

4.1.3 Human-centered design

According to ISO Standards (2010), *Human-centered design* is the practice of creating usable and useful systems or products, by focusing on human needs and requirements. This is done by focusing on effectiveness, efficiency and user satisfaction. Further, accessibility, sustainability and improving human well-being while developing systems is also emphasized in the standards. Explained by Giacomin (2014), *human-centered design* includes involvements with the product's or system's intended user group, where questioning, observing, and other activities are performed in order to gain insights for the development and evaluation phase.

In addition to involving users, the key principles of *Human centered-design* involves understanding and defining user and task requirements, a proper division of jobs and tasks between the user and the system as well as iterations of design solutions (Maguire, 2001). Lastly, allowing for multi-disciplinary design teams will also benefit from the *human-centered design* process.

4.1.4 Goal-directed design

Goal-directed design (GDD), developed by Alan Cooper, is a process aiming to address users' needs whilst also incorporating the business, organizational and technical considerations in the development of digital products (Cooper, 2014). At the core of *GDD* lies the process of understanding user goals.

Goals are based on human motivation and are the "expectation of an end condition" (Cooper, 2014, p. 14). Cooper (2014) presents that they are separate from tasks and activities since these only describe the steps conducted to achieve a goal. He also argues that products built to accommodate user goals are more likely to succeed than products built only to satisfy business goals (Cooper, 2014).

Cooper (2014) describes and exemplifies three types of models that are important to consider when designing products: implementation models, representation models, and mental models. He briefly summarizes the models in the following ways. Implementation models refer to the representation of the product's internals, how it executes its behavior to achieve its purpose. Mental models describe how the user

of a product perceives the product's functionality. Represented models are the designer's representation of the product's functionality (Cooper, 2014). Cooper (2014) concludes that designers should strive to create represented models that are close to the users' mental models. This will make it easier for users to learn and use the product, as well as understand how it meets their goals.

A thorough design process is required to create successful products with represented models that allow users' to efficiently accomplish their goals (Cooper, 2014). One such process is *Goal-directed design*. *GDD* combines market, user and stakeholder research methods with user modeling and scenario-based design. The *GDD* process includes six steps (figure 4.1) briefly described as:

1. *Research:* Involves activities such as defining the project scope and performing initial stakeholder interviews and user research to understand needs and behaviors.
2. *Modeling:* The creation of personas and representations of context and workflows.
3. *Requirements definition:* Involves envisioning the ideal user experience and develop requirements.
4. *Design framework:* Includes designing the overall structure, its core functions, information and key path scenarios as well as validation of user scenarios.
5. *Design refinement:* The creation of detailed design including appearance, behavior, visualizations and product behaviors.
6. *Design support:* Involves design support, throughout implementations and maintenance.

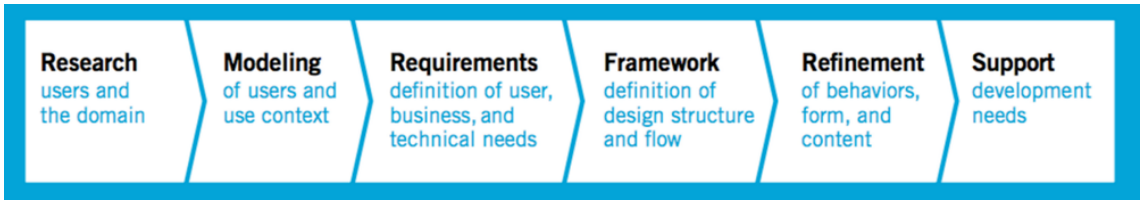


Figure 4.1: The goal-directed design process (Cooper, 2014, p.23)

4.1.5 Service design

The term *Service Design* was initially used by Lynn Shostack (1982). She described it in comparison to products as: "Products are tangible objects that exist in both time and space; services consist solely of acts or process(es) and exist in time only" (Lynn Shostack, 1982, p. 49). She emphasizes that a service is intangible and not something one can own, but rather something possible to experience, create or be a part of. Additionally, she explains that systems and services often exist in combinations, and suggests to look at it with a *Molecular modeling approach*. Which means that product and service combinations exist in complex, dynamic and organic relations where changes in individual entities or in the structure of the entities affect the whole.

Shostack also introduces a scale where she maps out the entities, from product-dominant to service-dominant to visualize that different products/services can lean towards one side or the other. To exemplify; salt and dog food is in the far left spectra and hence product-dominant, whereas teaching and nursing are to the far right, being more service-dominant. In the middle of the scale is the fast food shop, which represents an example that is a balanced entity equally weighted between a product and a service.

Sarah Gibbons (2017) talks about the definition of *Service design* in her article "Service Design 101". She describes it as the activity of planning and organizing a business's resources (people, props, and processes) in order to directly improve the employee's experience, and indirectly, the customer's experience."

Additionally, she defines the components of *Service design* that need to be designed:

1. **People:** Including users, creators and people indirectly affected by the service.
2. **Props:** Referring to both digital and physical products, spaces and objects.
3. **Processes:** All processes, systems and workflows that users, creators, stakeholders or staff take part in.

Furthermore, Gibbons underlines that *Service design* includes the, often ignored, experience for the employees by looking beyond the touch point for the users and also taking organizational internal processes into account. She argues that these factors have a great impact on the overall user experience, together with the touch points for the user.

4.2 The double diamond design process

The *Double diamond process* (Figure 4.2) is described by the Design Council (2018) as an illustration of a creative process, mapping out common cross-disciplinary approaches and processes of creative work. The representation is divided into four phases in which a project chronologically follows, acting as a road-map for design projects. These four phases are *Discover*, *Define*, *Develop* and *Deliver*. The phases are divided into two iterations, including both a divergent and convergent part, where the first one (*Discover* and *Define*) focuses on the problem itself and the second one (*Develop* and *Deliver*) on the solution. The Design Council also states that the design process is iterative, and allows for ideas being developed, tested and refined several times within the *Double diamond design process*. The following four definitions are based on a collaboration between the Design Council and Technology Strategy Board called "Designing methods for developing services":

Discover. This phase includes gathering knowledge, insights and inspiration around the domain and the problem. The main objectives are to clearly identify the problems, the opportunities and needs for the project to consider as well as define potential solution boundaries. This phase can include research methods involving users

and stakeholders, trend analysis and quantitative or qualitative research.

Define. The main purpose of this phase is to gather and analyze the findings from the Discover phase and to boil them down into comprehensive concrete opportunities. Also, this phase includes defining a clear brief, a problem formulation, agreed upon by all stakeholders.

Develop. Based on the design brief, in this phase the main objective is to iteratively explore and develop a product or service idea, in order to test it with users and refine it.

Deliver. In this phase, the whole concept is tested (usually by launch) in order to start addressing the identified need and brief, which also requires customer feedback processes to be established.

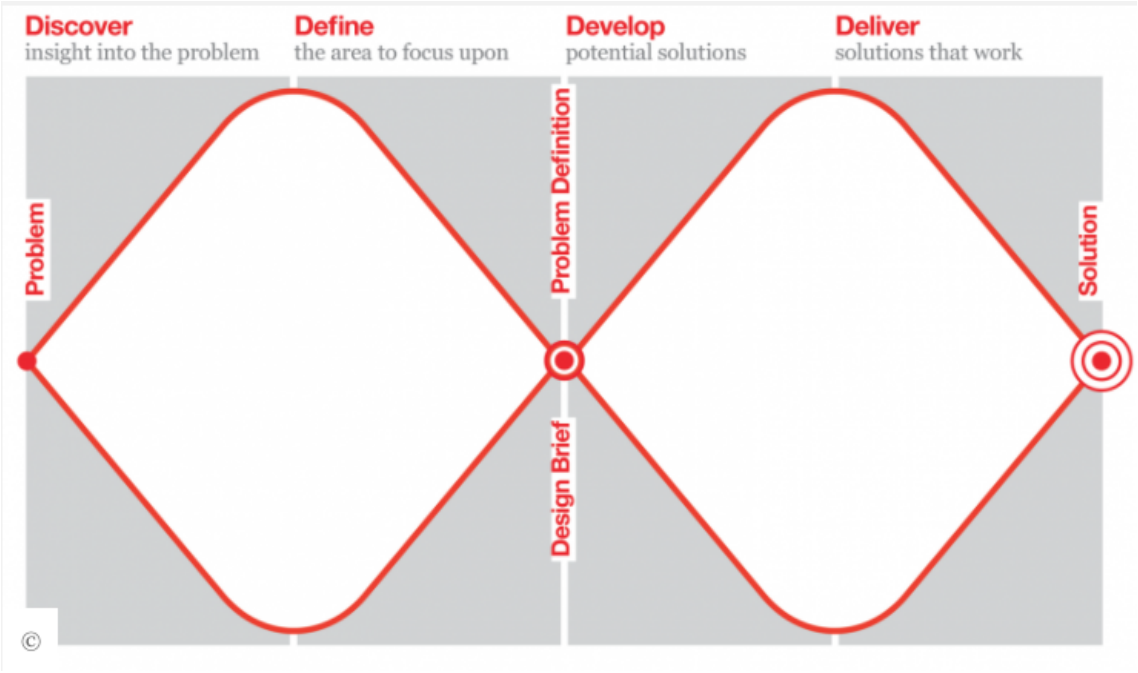


Figure 4.2: Double diamond process (British Design Council, 2018)

4.2.1 Variations on the double diamond process

Nessler (2016) describes a redesigned version of the *Double diamond*, with added explanation and adjustments. In contradiction to the Design Council's model, this model describes the *Develop* phase as a phase to develop several ideas. Differs does also the last phase, *Deliver*, in the sense that it focuses on prototyping and iteratively defining the multiple ideas into one solution (Figure 4.3). Also, he suggests to create a *How might we* (HMW) question, in order to focus the final problem formulation, the brief, in a concrete sentence.

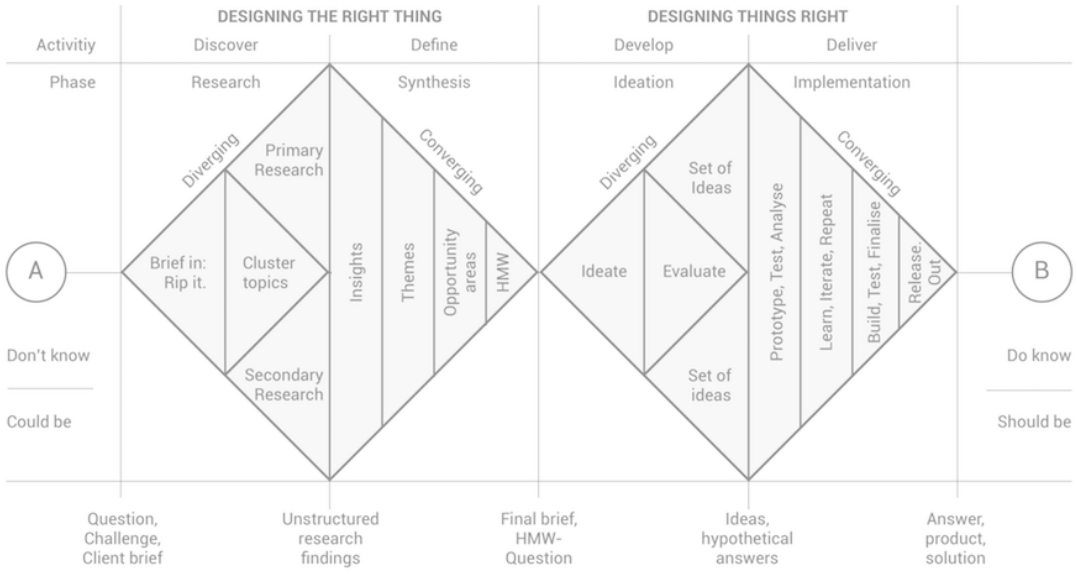


Figure 4.3: The redesigned double diamond (Nessler, 2016)

4.3 Research methods

In the following section, techniques and methods used for research in the project are introduced.

4.3.1 Literature review

Webster and Watson (2002) argue that reviewing relevant literature is an important part of a research project in order to develop a good foundation for theory and knowledge development. Wolfswinkel, Furtmueller and Wilderom (2013) suggest a five steps approach called *Grounded theory literature review method*, in order to collect and analyze project relevant information. They suggest approaching literature reviewing with the following steps:

Define. Here, the area of research and criteria for including literature are determined.

Search. The participants search through databases for relevant literature to add to the project's data set.

Select. Includes deciding what of the collected literature to filter out or focus on.

Analyze. By highlighting and structuring relevant information that is found while reading the literature.

Present. This phase includes representing and presenting the gained insights and analysis.

4.3.2 Interviews

Hanington and Martin (2012) describes interviewing as a fundamental qualitative research method, conducted in order to collect participants' opinions, thoughts, experiences and understandings around the researched topic. During an interview, a researcher asks a set of questions to a participant, most commonly in person. The interview can either be *structured:* where the researcher follows a predetermined set of questions, *semi-structured:* allowing for follow-up questions and some deviation from the prepared set of questions, or *unstructured:* where the researcher prepares a set of topics but has no strict script to follow allowing for more of a conversational approach (Sharp, Rogers & Preece, 2007). Also, interviews can take the form of group interviews, which are facilitated group discussions.

Hanington and Martin (2012) outlines that interviews can be either exploratory or designed for rigorous purposes. Interviews can be conducted with either stakeholders or potential users. In both, the researchers should aim for consistency across interview sessions.

4.3.3 Observations

Observation, as a research method, means to observe and document situations including people, environment, objects, interactions and events. The method can be either *unstructured*, *semi-structured* or *structured*. *A structured observation* commonly includes worksheets, checklists and structured coding (Hanington and Martin, 2012). A *semi-structured* observation allows detours from the plan and a *unstructured* observation is commonly conducted in an early phase of a design project, with the aim of collecting basic information and generate an understanding around the domain without any detailed plan (Hanington and Martin, 2012).

4.3.4 User journey mapping

User journey mapping is a research deliverable that visualizes a user's chronological experience with a service or product. It can aid in identifying and evaluating situations and interactions with a service that needs improvement (Hanington and Martin, 2012). In the book *Universal methods of design*, Hanington and Martin (2012) explain that *User journey mapping* "tells a story about an individual's actions, feelings, perceptions, and frame of mind-including the positive, negative and natural moments- as he or she interacts with a multi-channel product or service over time" (Hanington and Martin, 2012, p. 196). The method aims to take the larger context into account through recordings of the interactions between a user and the service or product researched. The method is advantageously used in combination with *Scenarios* and *Personas*, where the data is based on direct contact with customers and stakeholders.

4.3.5 Service blueprint

According to Lynn Shostack (1982), *Service blueprints* are used to identify problems and opportunities in existing or new services. Creating a service blueprint involves diagramming the whole process constituting the service, identifying places where the system might fail, and establish execution time limits. This includes both events visible and invisible to customers (Figure 4.4).

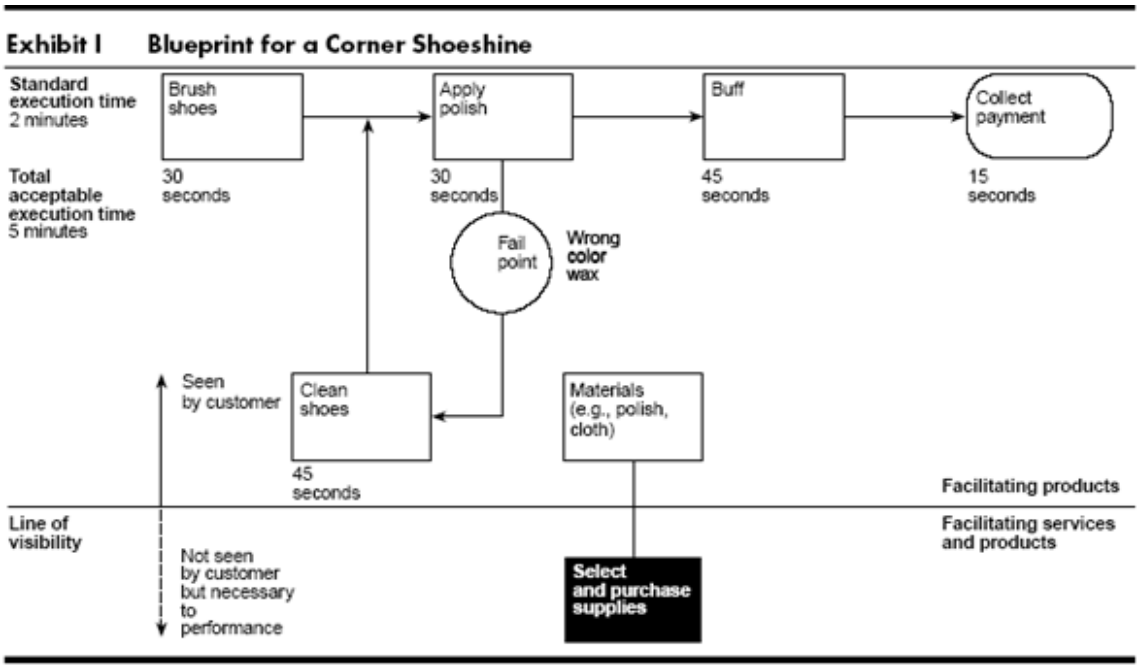


Figure 4.4: Shostack's blueprint for a corner shoeshine, (Lynn Shostack, 1982, p. 134

The Interaction Design Foundation (2018) describes a *Service blueprint* as an extension of a *Customer journey map*, including physical and digital interactions and several interaction categories expressed in horizontal swim lanes (Figure 4.5).

A *Service blueprint* aims to assist researchers in understanding or improving an existing service, designing a new service or gain better knowledge about actors in a service. This is done through a process consisting of: identifying the process to research and its customers, analyze the customer's experience of the service (see *User Journey map*), define employees and other actors actions and link the events in a chronological diagram.

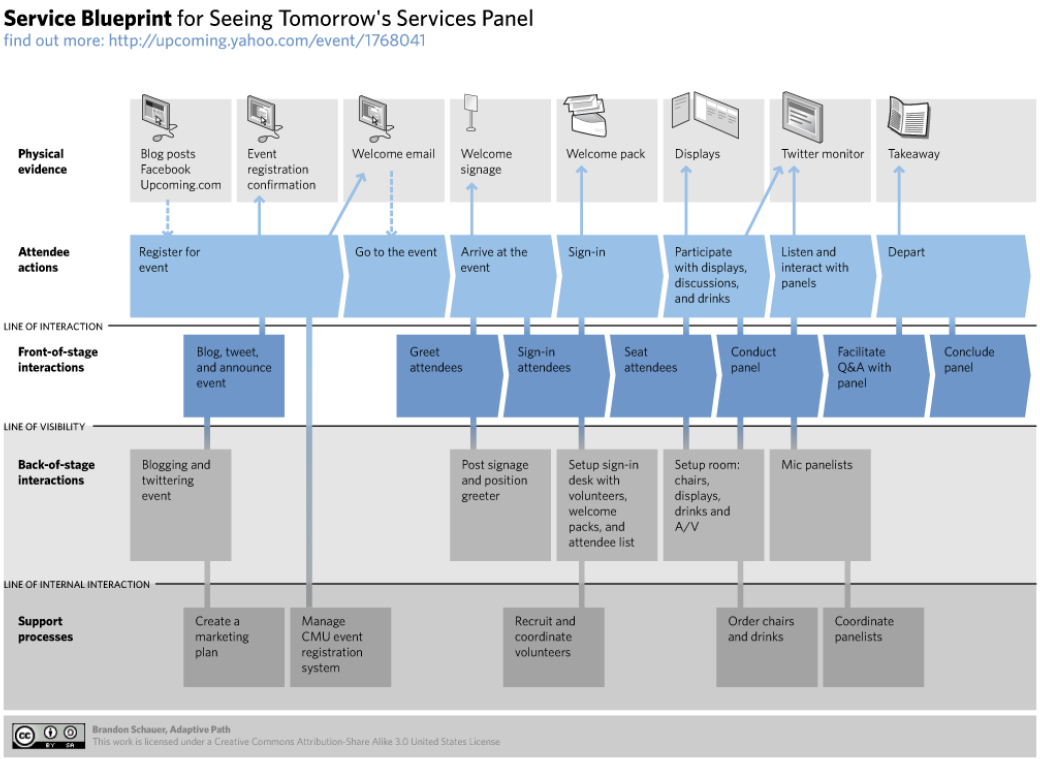


Figure 4.5: Service blueprint (Interaction Design Foundation, 2018)

4.3.6 The UX curve

Kujala et al. (2011) suggest that methods aiming to research or evaluate user experiences typically focus on short-term and/or first time experiences. According to them, this is problematic since previous research acknowledges that the user's expectations and experiences changes during the course of long-term experience of a product. Consequently, Kujala et al. (2011) present the UX curve. The method produces qualitative data about the properties and aspects of a product influencing long-term user experience. This is done by helping users describe their chronological experience with a product (Kujala et al., 2011).

The method uses a template consisting of two parts, presented to the participants in a face-to-face setting (Figure 4.6). The first part is a two-dimensional graph area where the horizontal axis represents time (from the initial adoption of the product to present day) and the vertical axis the intensity of experience. A horizontal line is drawn from the middle of the vertical axis in order to divide it into an upper positive- and lower negative area. The second part is a writing area where the user is able to describe why certain changes occurred in the curve. Participants are asked to describe a usage dimension, such as their overall experience with the product or its ease of use, by drawing a curve describing how their relationship with the product has changed from initial adoption to present day. Furthermore, the participants are

able to use the writing area to describe the changes in the curve.

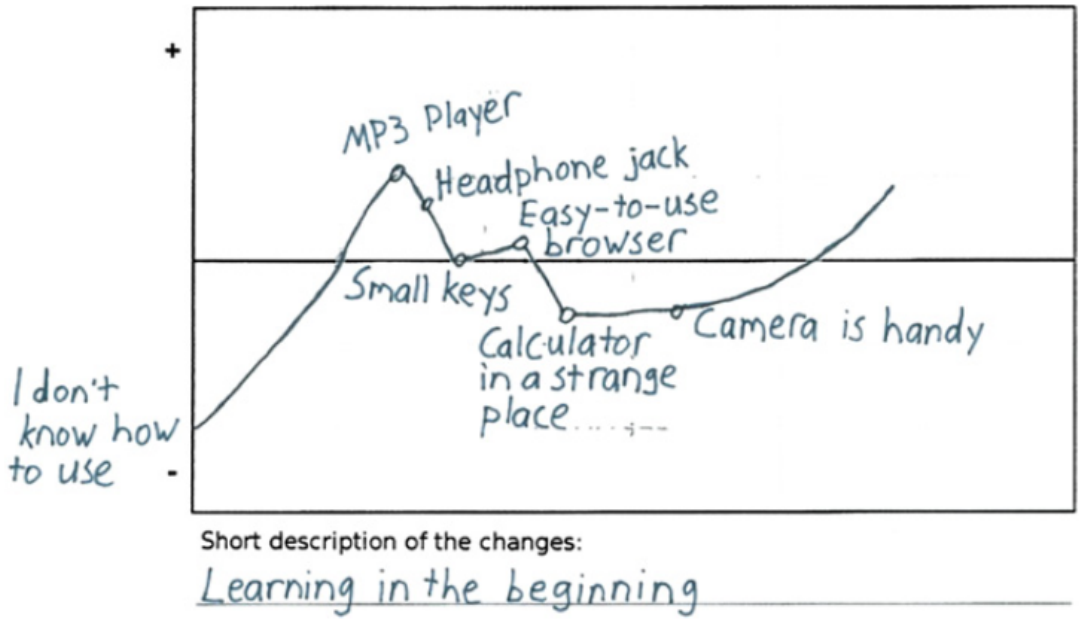


Figure 4.6: The UX curve (Kujala, et al., 2011, p. 478)

4.3.7 Think-aloud technique

The *Think-aloud technique* is a qualitative data collection method, often used during user or usability testing, allowing participants to verbally express feelings and thoughts while interacting with a product or system (Hartson and Pyla, 2016). This technique aims to give the researchers a way to access information that is usually not available through other evaluation methods. It aims to help the researchers understand biases, preferences, expectation and what forms the basis for the user's action.

4.3.8 Benchmarking

During benchmarking, information about existing products and services are collected and summarized, in order to gain knowledge about the market, current solutions and competitors. A typical activity is desktop research where online search engines are used to receive basic information regarding the research topic from websites, news articles and other sources. The research includes activities The insights could be used for inspiration during the ideation phase or to find potential problem areas where no current solutions yet are introduced (Bohgard et al., 2009).

4.4 Data analysis methods

In this section, the data analysis methods used in the project are described. These methods aim to analyze collected information from methods described in Section 4.3 and Section 4.6

4.4.1 The KJ method and affinity diagrams

Hanington and Martin (2012) describes the KJ method, which helps teams externalize, organize and prioritize ideas and information. Team members are tasked to write down findings, thoughts and ideas, in the form of statements, on sticky notes. Notes that share similar problems or intents are then, through a collective effort, grouped together into themes describing different dimensions of the problem. The result is an affinity diagram, a representation of the shared knowledge of the problem domain (Hanington and Martin, 2012). The KJ method is an effective way to reach group consensus and to prioritize the next actions required in the design process, even though it can be considered to be a subjective analysis form (Hanington and Martin, 2012; Spool, 2004).

4.4.2 Insight statements and "How Might We" questions

IDEO presents two coactive methods used to synthesize research findings into insights that can guide the brainstorming process, *Insight statements* and *"How Might We"* questions. IDEO, (2015a) describes that *Insight statements* are created using themes of information collected through research. The themes are reformulated as brief statements that describe the theme's core content. After creating the statements, the researchers should filter them and discard those that do not relate to the original design challenge. Subsequently, the *Insight statements* can act as the base for *"How Might We"* questions (IDEO, 2015b). According to *IDEO*, insights represents challenges. By rephrasing the challenges as questions that start with "How might we...", they can be transformed into design opportunities. *IDEO* presents that each insight can create several questions, which should then be iteratively refined until they allow for multiple possible solutions.

4.5 Ideation and representation methods

In this section, the methods used for ideation and representation of concepts, used throughout the project, are presented.

4.5.1 Brainstorming

Brainstorming was first coined by Alex Faickney Osborn (1953) and is referring to the process of generating multiple ideas in a group, with a quantity over quality approach and without any judgment, by targeting a defined problem. He explains that the participants at a brainstorming session write down or draw ideas, that then are shared with the group. Participants should aim to come up with ideas that

are crazy, preferably while also combining several ideas (Mongeau and Morr, 1999). Kelley and Littman (2001) emphasize the importance of a clearly defined problem statement, the idea of not allowing any critique during a session and to build on each other's ideas in order to create good conditions for an efficient brainstorming.

Several variations of brainstorming exist. For example, *Crazy 8* relies on creating eight distinct ideas in eight minutes. Participants are tasked to create eight sections on a paper, and then sketch one idea in each section before the time is up (Google, n.d).

4.5.2 Personas

Personas aim to capture user characteristics, behaviour, opinions and thoughts in a representative fictive profile, fostering user-centered design in the ideation process (Hanington and Martin, 2012). Personas are based on data collected from research and are grounded in behavior patterns, usually presented in a page-long description provided with a name, photo and key factors as life situation, goals and pain points related to the domain of research. Personas are used to reach a shared understanding and empathy for the target user of a design (Cooper, 2014; Harley, 2015).

4.5.3 Sketching

Sketching is a medium to explore, express and communicate design ideas in the early development phase. Mainly it is used when the focus is still on exploring concepts rather than details, usually in the form of quick freehand drawing (Pyla & Hartson, 2012). Sketching aims to supports brainstorming, and facilitate discussions within and outside the design team, with the goal of exploring possibilities for creating various design ideas.

4.5.4 Prototyping

Prototyping is used to realize and refine design ideas and build concrete design representations for tests and evaluations. A prototype aims to try out a design solution, hence need to be easily modified. Usually, it is a simplified system including less functionality than a version of the real system. Prototypes can vary from pen and paper prototypes to interactive prototypes that are programmed (Pyla and Hartson, 2012). The technique of *Wizard of Oz* is commonly used to complement a prototype, where the goal is to get participants to believe they are interacting with a working prototype, but a researcher is acting as a proxy for the system (Hanington and Martin, 2012). A prototype can vary from low-fidelity to high-fidelity. A low-fidelity prototype excludes details of look, feel and behavior in order to focus on structure and hierarchy. A high-fidelity prototype is a detailed digital representation including a realistic appearance of look, feel and behavior of a product or system (Pyla & Hartson, 2012).

4.5.5 Storyboard

A storyboard aims to visualize the interactions between a user and a product or system, presented in the form of visual frames in a chronological sequence. The method aims to give the designers and product developers an understanding of likely scenarios and how the product or service could be used in the real world, often through hand-drawn images including actors, screens or products, annotations, dialogues and user actions (Pyla & Hartson, 2012).

4.6 Evaluation methods

In the following section, the evaluation methods used in the project will be introduced.

4.6.1 PUGH matrix

A *PUGH matrix*, also called *Decision-matrix method*, is used to evaluate and rank concepts (Pugh, 1981). A list of criteria or requirements are collected in a weighted list, together with the different concepts that are under evaluation. The concepts total sum of points is compared to a reference, the original or current solution. For each criterion, the concepts are given points depending on if they fulfill it better (1 point), worse (-1 point) or equal (0 points) to the reference.

4.6.2 Usability testing

Jakob Nielsen defines usability as "a quality attribute that assesses how easy user interfaces are to use" (Nielsen, 2012). Subsequently, he identifies five components that constitute usability: learnability, efficiency, memorability, errors, and satisfaction. In order to evaluate a design's ease of use, usability tests can be applied. In these tests, representative users are asked to perform a series of tasks in the interface while the researchers observe their progress (Nielsen, 2012). According to Cooper (2014), usability tests are useful when validating a design's naming, organization, first-time use and discoverability, and effectiveness. However, Cooper (2014) also stresses the fact that usability tests focus on validating the first-time usage, and it can be difficult and laborious to evaluate how a design's impact changes over time. Nielsen (Nielsen, 2000) argues that researchers should limit the number of participants being usability tested on a single design due to the tests' diminishing returns. An increase in participants does not result in a significant increase in novel insights. He suggests that usability testing is the most efficient and affordable when performed in several iterations with no more than five users.

5
Planning

The project's process will, on a high level, be based on the double diamond model (Design Council, 2018). The process will consist of a set of design iterations, meaning that the phases should be performed multiple times in order to generate a large set of viable solutions. The four phases that constitute the model, and the choice of methods in each phase, is presented below. A simple weekly planning is visualized in figure 5.1.

5.1 Discover

During this phase, research methods such as literature review, initial observations and interviews with both guests, employees and business stakeholders at *Liseberg* will be conducted. Further, benchmarking studies will be conducted in order to understand current solutions and competitors. A version of *User journey mapping* or *Service blueprint* might be conducted to gain knowledge about the current user journey when visiting the amusement park.

5.2 Define

The define phase focuses on processing the knowledge, insights and ideas collected through research. The goal is to converge the collected material into problem statements, used as anchor points from which solutions will be created in future phases of the process. To do this, the KJ method and affinity diagrams will be used.

5.3 Develop

In this phase both ideation, prototyping and evaluation methods will be conducted. The ideation methods will include *Brainstorming* and some evaluation of the early concepts. For concept development, the methodologies of *Sketching*, digital *Prototyping* and *Storyboards* will be used. Parts of the *Goal directed design process*, specifically *Design requirements* and *Design framework* can also be used to create the foundation of the solution's content and functionality. Finally, evaluations of the prototypes will be conducted, for example with the method of *Usability testing*.

5.4 Deliver

The final phase, deliver, should be conducted once a high-fidelity prototype has been created. By using evaluation methods specified in section 5.3, data about users' perceptions of the solution should be analyzed and put into practice by refining the prototype.

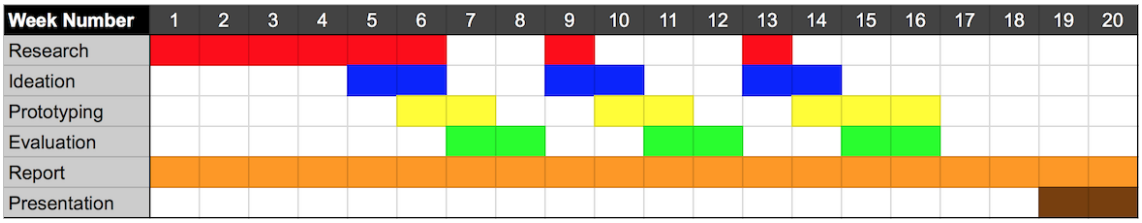


Figure 5.1: The project's weekly planning

5.5 Ethical considerations

The project will contain research of both *Liseberg's* guests and staff. Thus, it is important to conform to ethical standards in research. Participants that are involved in interviews, detailed observations and user tests will be informed of the study's purpose, give consent before participating and be treated with confidentiality in both the analysis of the data and the report. Information about individuals will only be used in the context of research and not presented to stakeholders or in the report. These goals are in line with the guidelines presented in the *Swedish research councils* ethical principles of research (Vetenskapsrådet, 2002). If participants are under the age of 18 years old, the consent to participate should be given by their legal guardians. Guests that are a part of larger quantitative and holistic observations, regarding flows and logistics, might not be asked for consent since no data regarding the individual guest is recorded. However, the aim in all user studies will be to receive full consent from all the participants.

The collected data are to be anonymized before stored in any way, hence impossible to track back to any participating individual or group. The anonymized data are to be accessible only by the authors before being added into this thesis project report.

6
Process

In this chapter, the complete project process is described. Initially, the pre-study is discussed following three research sections of *User research*, business stakeholder research and a summarizing section synthesizing all collected and analyzed research. Further, the *Ideation* phase is explained together with the different phases of concept development and testing.

6.1 Pre-study

In this chapter, initial studies regarding the domain can be found. Methods used throughout this phase are presented in detail below and includes *Literature review*, *Benchmarking* and previously collected data from *Liseberg*.

6.1.1 Literature review

A literature study was conducted during the first four weeks of the project. The result is presented in the chapters 1, 3 and 2 and 4. The goal of the review was to create a solid theoretical foundation that could be used to further work with and partly answer the research question. Furthermore, it was used to gain an enhanced understanding of the domain, relevant theory, and design methodology. Due to the novelty of the domain, multiple industry and academic resources were investigated to collect an overview of the current state and challenges of the domain. This included research into both amusement parks in general, and queuing in particular. Due to the hedonic focus of amusement parks, papers and books concerning experiences, emotions, and experience-centric services were researched to gain insight into these key areas.

6.1.2 Benchmarking

Benchmarking was performed to research, map and analyze current queuing solutions at amusement parks. The aim of the benchmark was to understand and find patterns among current services. Also, information that could be used later in the ideation phase was of importance to collect. Information regarding existing services would act as either inspiration for new solutions, or to identify problem areas that could be developed further.

The benchmarking was conducted using the top 20 amusement parks and water parks in the world (attendance), as well as an additional 17 amusement parks with guest counts in the same range as *Liseberg* (TEA/AECOM, 2016). Among the 37 parks, 29 of them used some sort of bypassing queuing service. The complete benchmarking study can be found in Appendix E, but the most usual systems identified are summarized below.

Time-slot approaches
12 parks used services were guests book, or receive an assigned time slot during which they can use a priority queue at an attraction. Depending on the park, these services were either included in admission or available for purchase before or during a visit. Usually, the time-slots were available on a subset of attractions at the parks.

Open approaches
14 parks let visitors purchase a pass that allows them to bypass the ordinary queue. In contrast to the time-slot approaches, these solutions did not require the visitor to use the priority queue at a specific time. Instead, the passes are usable whenever the visitor wants throughout the day. Most parks provide passes usable one time per attraction, while others offer secondary price tiers with passes usable unlimited times per attraction.

Q bot
At three parks, visitors can purchase access to the proprietary virtual queuing solution Q bot. The systems let visitors use a small handheld device to reserve a place in line to an attraction without physically being in the queue. Meaning that they can experience other areas of the park while standing in a virtual line. The virtual waiting time is decided by the waiting time of the normal queue. When the waiting time is over, visitors with the q-bot system are notified and can use a priority queue to access the attraction. While the virtual waiting time depends on the normal waiting time, some parks offer price tiers were visitors can pay extra to make the virtual time be a percentage of the full normal waiting time.

6.1.3 Previously collected data from Liseberg

During several years, *Liseberg* has been collecting data from guests visiting the park, through contextual oral surveys and structured interviews. The project team accessed the data through a web tool provided by *Liseberg*. The data showed a significant increase in the guest intensity during the summer season, and also indicated that guests were less satisfied with their visit and the queues during the middle of the summer season, the peak season. During 2017 there was in total 1,110,510 visitors during the peak season, and 621,436 in total during the preseason, which is a difference of 44 %. Figure 6.1 visualizes the number of visitors at the park during the summer season 2017. Also, the data showed an uneven distribution of guests across different weekdays. The total amount of visitors on Saturdays throughout the summer is more than double the amount of visitors on other, less popular days

(Figure 6.2). These both findings regarding uneven distribution could be an issue in regards to fully utilizing the amusement park and optimizing the guests' visits.

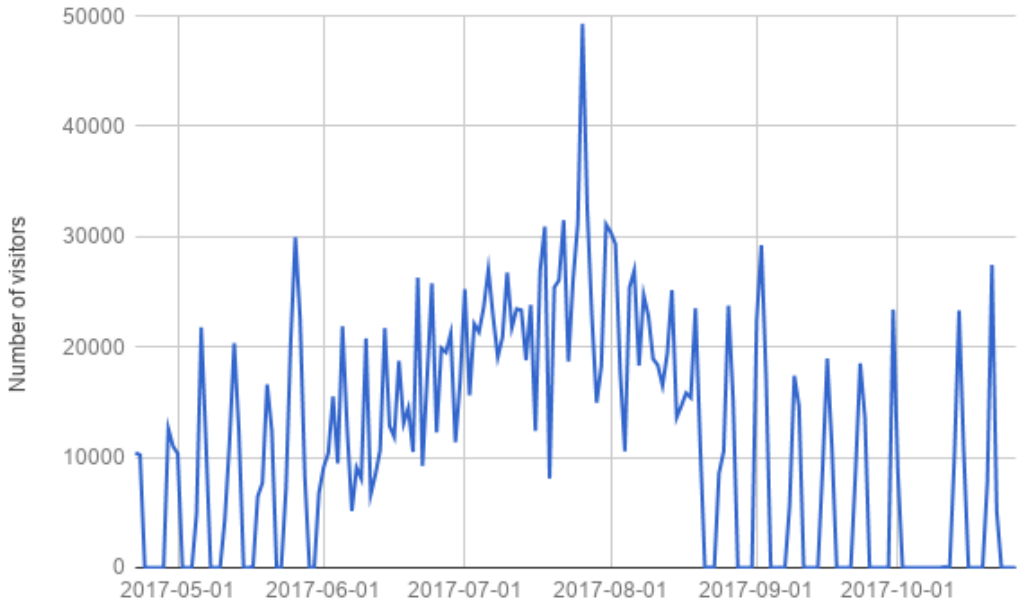


Figure 6.1: The number of visitors per day at *Liseberg* between *2017-04-22* and *2017-10-26*

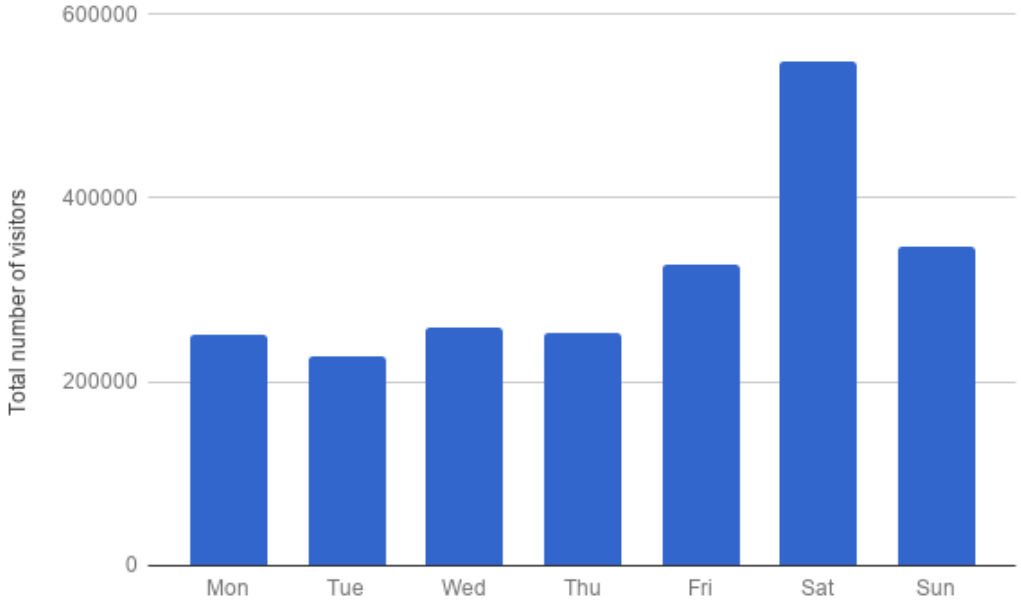


Figure 6.2: The total number of visitors for each weekday at *Liseberg* between *2017-04-22* and *2017-10-26*

The collected data also suggests that while general guest time varies, the average duration spent in the park is higher during peak season than during preseason with around 30-90 minutes per visit. Additionally, it shows that families are the biggest group of guests, constituting about 70% of the total amount of visitors throughout the summer.

During 2016, the average company size was 4.9 persons during the preseason, and 5.11 persons during peak season. During 2017, the company sizes were similar. During preseason that year the average was 4.59 persons per company, and during peak season the number rose to 4.66 person per company. The research also includes data regarding where the visitors come from. During 2017 57,30% of preseason guests, and 32,49% of the peak seasons guests are living within 40km. The same year, the data shows that 23,63% of preseason guests, and 20,97% of the peak seasons guests, are living within 50-190km. This means 43,88% of peak seasons guests and 21,73 % of preseason guests are traveling 200 km or more to visit *Liseberg*. The data regarding guests would be utilized further in the project through the user research, specifically when deciding participant samples and how to focus the concept development regarding user groups.

There have also been efforts to collect data about the guests' sentiments towards the park and its services. Guests were recruited at the park and tasked to fill in a questionnaire with questions rated using a five-point scale. Queuing is revealed to be a major problem, especially during peak season. Figure 6.3 shows the percentage of guests dissatisfied with queues at *Liseberg* throughout the summer season of 2017 (from April the 17'th to September 25'th 2017). In this case, dissatisfied means that they rank the experience 1 or 2 on the 5-point scale.

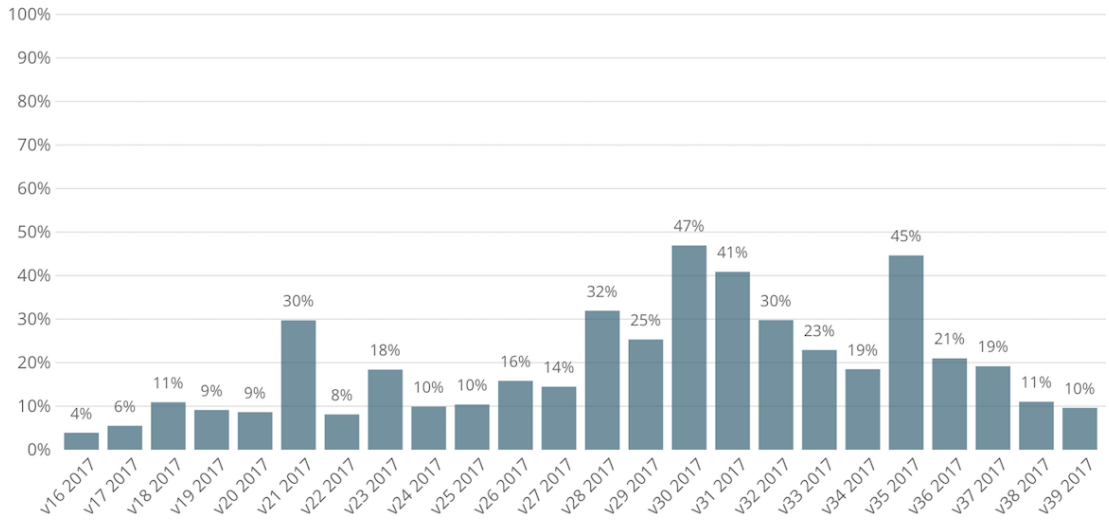


Figure 6.3: Percentage of guests per week ranking the general queuing experience 1 or 2 out of 5 during the summer season 2017

Furthermore, the data suggest that queuing to attractions was a larger issue than queuing at the entrance during the summer season 2017. Figure 6.4 shows that, in general, the percentage of dissatisfied visitors is higher at attractions than at the entrance.

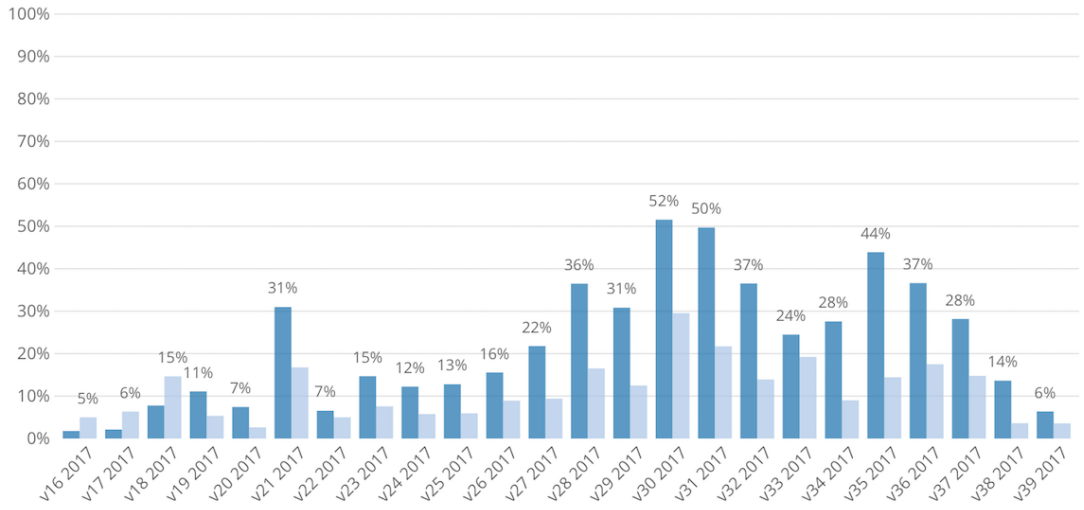


Figure 6.4: Percentage of guests per week ranking the queuing experience at attractions (dark blue) and entrance (light blue) 1 or 2 out of 5 during the summer season 2017

An extensive summary of data regarding demographics from preseason, peak season and postseason from the past three years can be found in Appendix F.

6.2 User research

This section describes the process of researching amusement park guests, their needs, and frustrations through interviews. The result of this phase was used to create *Personas* and *User journey maps*.

6.2.1 Contextual interviews

Semi-structured interviews with nine *Liseberg* visitors were conducted in order to gain insight into sentiments surrounding the *Liseberg* experience in general, and queuing experiences in particular. The semi-structured approach was chosen because of its combination of structure and flexibility. It allowed the interview to be centered around a set of questions that explored the domain, while still being open to explore other problem dimensions further. The questions covered several aspects of a *Liseberg* visit. Initially, they focused on the general perception of *Liseberg*: how guests visit the park and what they enjoy and dislike. Later, the questions dived deeper into expectations and experiences of queuing; asking participants about their sentiments towards waiting times and what they do while waiting. The full set of

questions can be found in the interview guide in Appendix A.

The nine participants consisted of five males and four females. Their ages ranged from 9 - 68 years old ($M = 31$). A total of seven interviews were conducted, meaning that two of the interviews were done with respondents answering in pairs of two. The interviews were conducted in the gaming house at *Liseberg*, which meant that distractions such as people passing by and noise occurred throughout the interviews.

Initially, participants were introduced to the study and its purpose before answering a series of introductory question, such as their age and occupation. The interview then followed an interview guide, regarding general opinions and experiences from *Liseberg* and queuing at *Liseberg*, the guide can be viewed in Appendix A. If necessary, the participants were probed for more information about their answers. The responses were written down in a notebook and later transcribed into a word processor. Each interview was approximately 15 minutes in length.

The responses were processed using the *KJ analysis* method (Section 4.4.1), shown in figure 4.4.1. The goal of the analysis was to summarize the collected material and gain additional insights into the guests' *Liseberg* experience. Statements, thoughts, and experiences appearing in the responses were written down on post-it notes and then gathered into meaningful groups. The result was a set of themes that describe different dimensions of the queuing experience at *Liseberg*. No ranking of the themes was performed.

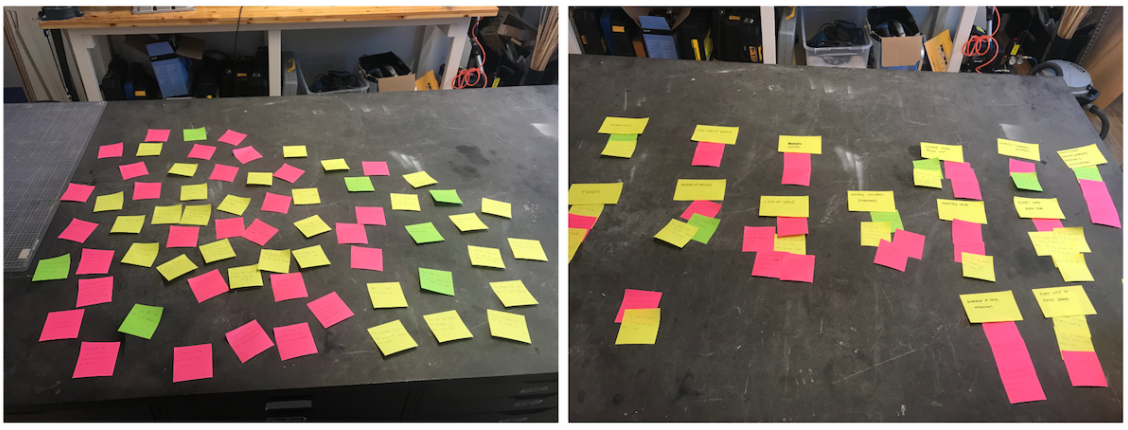


Figure 6.5: Conducting KJ Analyis

The result of the *KJ analysis* is presented below, explaining each of the identified problem areas.

Queues create negative emotions
Guests feel queues and long waiting times are problematic. This results in several negative emotions when queuing, such as boredom, uncertainty, restlessness and lack

of motivation.

Guests accept some queue time depending on the situation
Guests accept a varied amount of queue time depending on the situation and context of waiting. For example, novelty (e.g a new roller coaster) can increase motivation to queue for longer.

Perceived monetary value
Guests feel that they waste money if they purchase an expensive ticket and are unable to experience attractions due to long queues. Guests strive to get their money's worth at *Liseberg*.

Guests plan their visit to avoid crowds and queues
Guests expect their *Liseberg* visit to include queuing and waiting. However, they try to plan their visit beforehand in order to reduce waiting times and avoid crowds. They make conscious decisions to avoid queues while being at *Liseberg*. For example, some guests are visiting *Liseberg* before or after peak season. Many guests also look at queue time estimations, in order to choose attractions with less waiting time.

Queues are physically uncomfortable
Crowding affect the guests negatively. They feel that the lack of space, mainly while queuing, is problematic since they cannot move freely. Also, the lack of places to sit/lean can be uncomfortable.

Social interactions are important
Guests think it is important to have other people with them when they queue since it makes waiting more meaningful.

Keep guests occupied
Guests look at their phone, talk to friends, and more to fill their time while queuing.

Keep children happy
Guests with children feel they need to keep the children in a good mood when waiting in lines, for example by distracting them from the waiting time.

6.2.2 Supporting interviews

Additional research was done to gather more information about *Liseberg* guests, which in conjunction with previous interviews was used in the creation of personas. The target group was teenagers, due to the lack of responses from this age group in the previous interview segment. The *Semi-structured interview* methodology was chosen for the same reasons as presented in section 6.2.1. The interview guide consisted primarily of the same questions as before, but with a few new questions that explored motivations and experiences of a *Liseberg* visit. The full interview script can be found in Appendix B.

Five participants were involved, 3 girls and 2 boys aged between 13 - 18 ($M = 15.6$). Two of the interviews involved two participants simultaneously, meaning that both answered questions in the same session. Participants were recruited at Gothenburg's city library.

The responses were in line with answers provided in the previous interviews. Thus, the analysis consisted of relating previously identified themes with the added responses. All participants expressed that queuing and waiting was the aspect of a *Liseberg* visit they disliked the most. A reoccurring theme in the responses was also the importance of social interaction. The participants visited *Liseberg* with friends and family, and described that having fun with other people was one of the most important parts of the *Liseberg* experience.

6.2.3 Personas

Utilizing insights from the interviews and demographic data from *Liseberg*, personas that model two types of guests were created. The goal with the personas was to provide brief representations of different *Liseberg* guests in order to develop *User journey maps*.

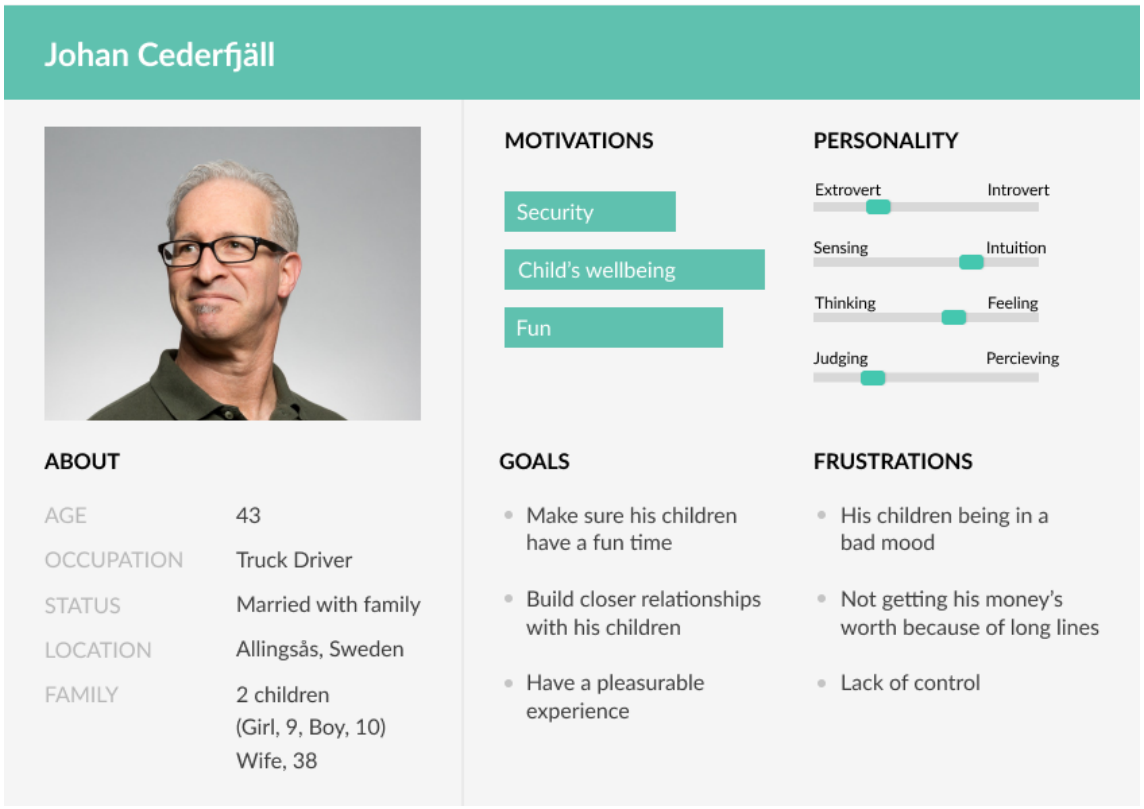


Figure 6.6: Persona 1, The father Johan

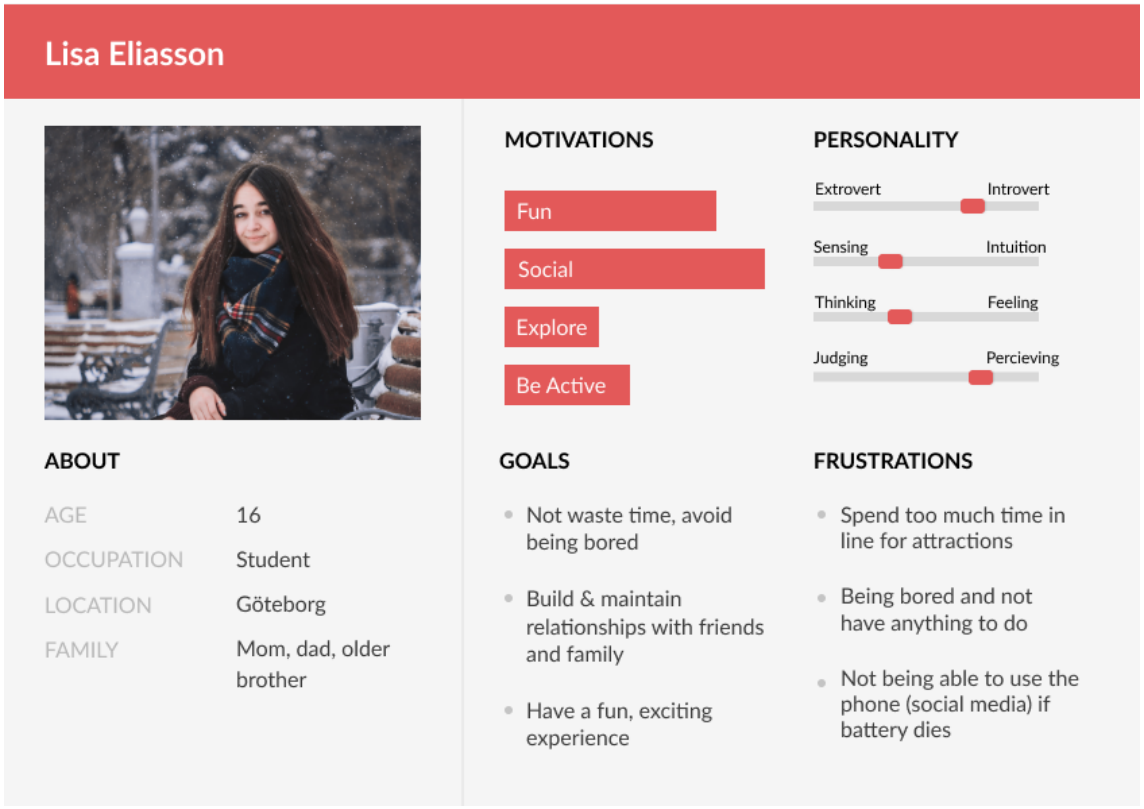


Figure 6.7: Persona 2, The teenager Lisa

The personas try to capture two different types of users; their goals and frustrations and motivations. Johan represents parents that arrive at *Liseberg* accompanied by their children. Although he wants to enjoy the *Liseberg* experience, his primary motivation is to entertain, and spend time with, his children. Since he lives outside of Gothenburg, he plans his visit before going to *Liseberg*. Lisa lives in Gothenburg which means that her visits are mostly spontaneous. She is there with her friends and values the social interaction highly, but also expects the attractions to provide fun and excitement (more so than Johan). Creating contrasting personas help to highlight differences and similarities in the *Liseberg* experience for different groups of guests.

The personas were created in order to give the project group a clear user focus for the whole process of ideation and concept development. Beneficially, the personas also subconsciously worked as a tool to create a common design language, internally in the project group but also externally towards stakeholders. The personas were also created in order to act as a base for future test participant recruitment, as well as inspiration in the upcoming brainstorming.

6.2.4 User journey mapping

User journey maps, based on the personas and its underlying research, were developed to represent the current *Liseberg* experience (Figure 6.8 and 6.9). The journey

maps visualize the two personas' experiences visiting *Liseberg*, including their visit's main phases, any actions they take and the motivations behind them, as well as the thoughts and emotional experience of the visit. Finally, the map also shows the touch points the personas have with the service, as well as design opportunities for every phase.

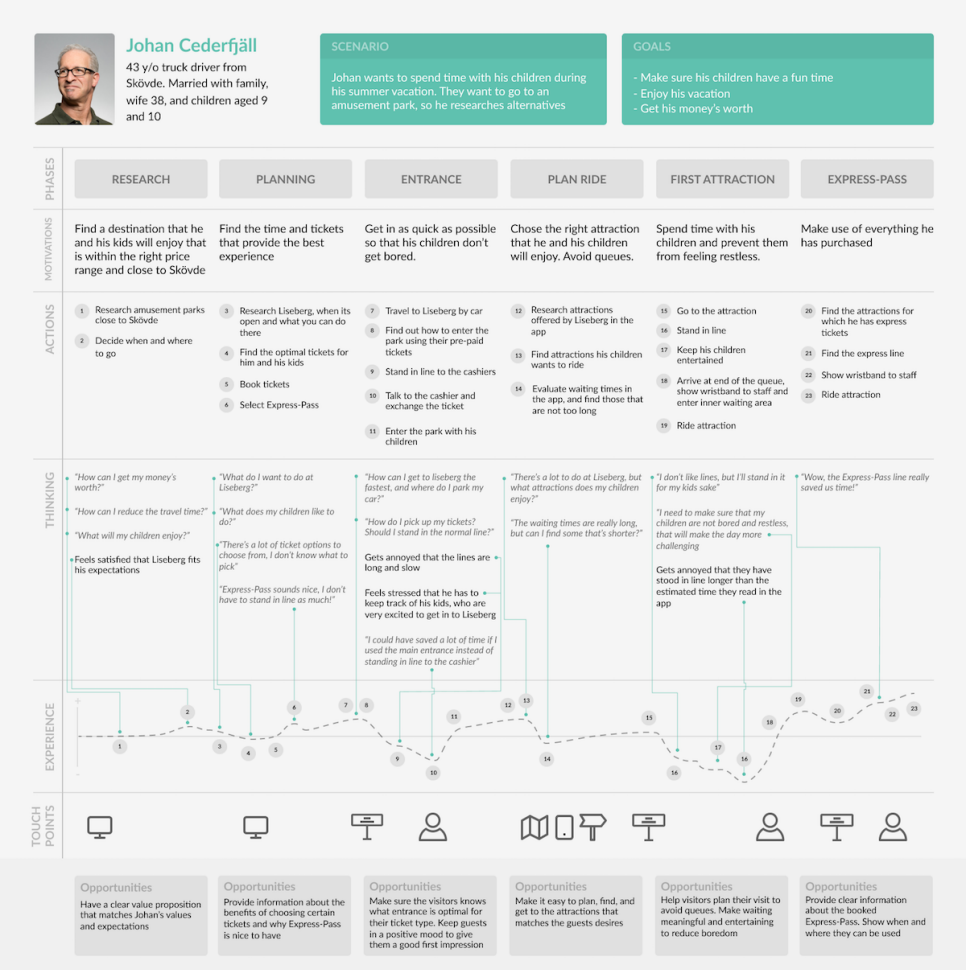


Figure 6.8: The *User journey map* of persona 1, the father Johan

The maps are based on research, but some assumptions of the user journey had to be made for the sake of creating valuable representations. The assumptions are primarily related to the phases and actions, and somewhat to motivations. While the guest research elicited relevant information about thoughts and emotional experience, the exact order of events occurring during a *Liseberg* visit for our personas was not clear through the research. The phases and actions have been decided through a discussion about the personas and some assumptions of gust behavior. For example, it was decided that the user journey of the persona 1, the father, should include the *Liseberg* website and online ticket booking. The father lives outside of Gothenburg, which means that it is likely that he plans his visit in advance.

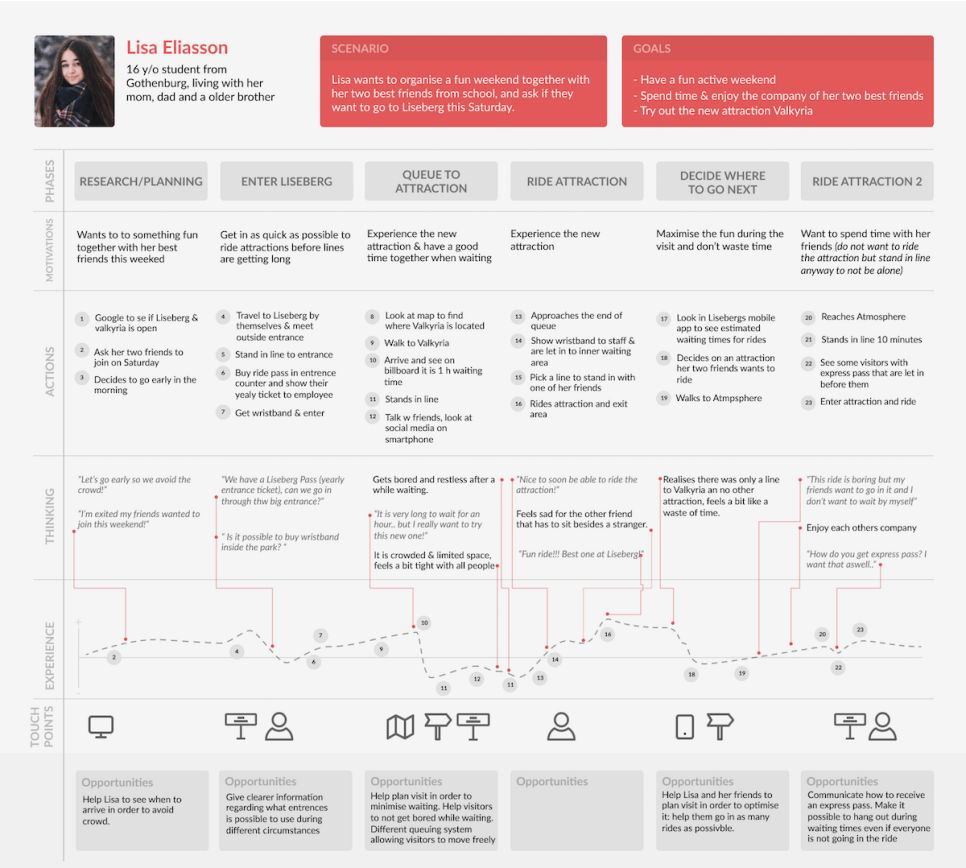


Figure 6.9: The *User journey map* of persona 2, the teenager Lisa

The journey maps filled three roles in the design process. First, the process of creating them helped the researchers form a better understanding of the future solutions. Secondly, the journey maps were returned to occasionally throughout the project to the support other design activities such as the brainstorming. Finally, they were communicated to business stakeholders in order to exemplify and support discussions about the user research process and its results.

6.3 Stakeholder research

An important part of service design is to consider not only the experience of the user of a service, but also the employees providing it (Section 4.1.5). Interviews with *Liseberg* employees and management team were conducted to research how the working process at *Liseberg* operates, as well the employees' experiences of working at the park. By understanding both guests' and employees' perspectives, a more holistic view of *Liseberg* is created.

6.3.1 Liseberg management

To understand *Liseberg's* business goals, stakeholder expectations of the project, and previous efforts to combat queuing, a meeting with *Liseberg* management was

performed. Three employees were attending the meeting, the manager of Digital sales, the manager for entry and tickets and the manager for Attractions and Sales.

The meeting discussed the phase of the project and expectations of both process and results. The attendees discussed several problem and opportunity areas and took practical decisions around how to further work together with this project. The project members recorded notes during the meeting, which were summarized and collected into categories afterward. The areas of problems and opportunities found during the meeting are listed below:

Problem areas

- *Guests main complaints are about queuing.* Surveys performed by *Liseberg* states that queuing is one of the largest problems according to their guests.

- *Uneven distribution of guests increase waiting times.* A few attractions are over-represented regarding problems with long waiting times, whereas other attractions at the same given time have short waiting times. Also, there is an uneven distribution over days and weeks during the summer season.

- *Monetary loss due to queuing.* Guests that are queuing inside the waiting areas to ride attractions are unable to consume any other of *Liseberg's* other offerings.

- *Guests do not know what possibilities they have when entering the park.* Guests approaching the entrance are unsure about their different alternatives regarding where to buy certain tickets or entrance passes. Also, they are uncertain about what entrances they are allowed to use if they have earlier purchased tickets or passes.

Opportunity areas

- *Positive consequences of queuing.* There are some positive consequences for the park by having long queues for attractions within the park. As an example, the rest of the park including restaurants and other entertainment would be more crowded if people did not have to physically stand in line while waiting for their turn to ride attractions.

- *Queues represent high interest.* Longer lines to attractions can indicate popularity or validate its quality and may attract guests even though the waiting times are long.

Also, additional information about *Liseberg's* current systems was collected during the meeting. Firstly, it became clear that it is only guests booking online that will receive access to *Liseberg's* current *Express-Pass* system. These guests get the

opportunity to choose three attractions to use with *Express-Pass*. The passes are valid for 30 minutes, and the guests are able to choose a specific time slot for when to use the pass. Secondly, the project group received information regarding the time estimation system. It was found that the employees are manually updating the estimated waiting time for each attraction by entering it in a system, through a touchpad or a phone call. Lastly, information regarding *Liseberg's* user survey was discussed. It appeared that the only feedback collected about guests impressions of queues was a question in the survey asking "How satisfied were you with the short lines today?"

The meeting addressed expectations of project outcome and previous efforts to combat waiting time. Due to *Liseberg's* brand and values, the management agreed that they were not looking for any solutions that include paying extra to skip lines. Further, they believed that the solution would be connected to smartphones in some way, but did not want to forego any conclusions about the project's outcome. Previous work to improve the guests' experience of queuing was also discussed. The *Helix game* was viewed as a success due to the number of downloads and played games. Finally, *Liseberg* have been in contact with companies selling queue management solutions, but feels that they are forced to adjust to their systems to a large extent. Also, the providers did not have established solutions for handling edge cases, which is unusual expected or unexpected situations requiring special handling. This is important for *Liseberg* to support, due to planned or unplanned attraction breakdowns.

6.3.2 Liseberg employees

Since queuing appears both by the entrance to the amusement park and attractions, employees working with both entrance, park maintenance and attractions were included in the research. Five employees were recruited using a convenience sample. Ages ranged from 24 - 28 ($M = 26$). All participants had worked at *Liseberg* in the last few years, but in different roles. One had experience as a park host, three worked on different attractions, and one worked at the entrance. The interviews were 30 - 60 minutes long.

The interviews used an approach inspired by the *UX curve* methodology (Section 4.3.6). Initially, the participants were introduced to the project as well as informed about the purpose of the interview. Then, participants drew a horizontal line on a whiteboard or paper representing a timeline. They were instructed that the beginning of the line represented them waking up in the morning, and the rightmost when they get home after work. Participants then described, in chronological order, the events occurring during a typical work day, while making notes on the time line where necessary. The participants were probed to describe some events further using questions from the interview guide (Appendix C). Once the time line was completed, a second time line was drawn above or below the first one. Participants were asked to draw a curve representing the emotional experiences of the different tasks and situations encountered throughout the day, as well as talk about any changes

in the curve. Their description of the workday informed the creation of the *Service blueprint* (Section 4.3.5), while the emotional experience curve highlighted employee concerns to consider when designing a solution that improves the guest experience. Responses were noted down in a word processor. Examples of the time lines and UX curves created by the participants can be found in Appendix D

The collected research was compiled into three documents. The first document focused on explaining a typical work day for a *Liseberg* employee, the other two were a collection of relevant quotes grouped into categories. One presented quotes related to employees' experiences, the other quotes related to queuing. The two collocations are described below.

6.3.2.1 Summary of a work day

The following paragraphs summarize a typical work day, as described by the interview participants and their timeline. Note that the summary has generalized participants responses to a common description.

Before work
The steps described here are performed by employees at both entrance and attraction. Employees arrive at *Liseberg*, change to their uniform then clock in and pick up their daily schedule. It shows when and where they work that day. The employees at attraction rotate between different attractions several times a day, while someone at the entrance is seated at the same counter all day, with breaks now and then. Some days they receive an estimation of the number of guests, but employees can often infer how many will be there by checking the current season and day.

Working at an attraction
Attraction personnel arrives at the first attraction specified on their schedule. Before opening, they perform set-up operations such as controlling the attraction area, doing a test run of the attraction and adjusting the queuing area.

There's a varied amount of personnel depending on the attraction. Some attractions have one employee operating everything, and others can have as many as seven. (there might be others with more, but that's the highest amount given in these interviews).

When there's multiple staff, a key position is the operator, who's responsible for controlling the ride and making sure that everything runs smoothly by looking at security cameras. There's usually one employee responsible for checking guests' tickets, and several employees stationed at the platform, helping visitors get seated in the attraction. The personnel rotates these positions during their shift. However, an operator can only rotate with another operator. At the beginning of the day, one of the employees also needs to adjust the queuing area when more visitors arrive. This can be a stress factor since the attraction needs to operate as normal with one less person. In order to start a ride, personnel on the platform signals to the operator that everything is ready by each pressing a button, the operator then starts the ride

by also pressing a button.

If a person is individually controlling the attraction, they are responsible for the whole ride process. When a ride is finished, the employee usually opens the exit gate. Then, they control tickets and safety regulations (e.g height of riders) of the next batch of visitors before letting them in. Finally, the employee checks that everyone is correctly seated before starting the ride by pressing one (single command) or two (double command) buttons.

Attractions at *Liseberg* can run into errors. Various incidents can cause attractions to stand still. Small things can happen every day. It's the operators' responsibility to communicate the error to the visitors by announcing what happened on a P.A speaker system. In certain cases, visitors need to be evacuated from the ride. Employees working close to the queue, for example the ones responsible for handling tickets, also talk to the visitors about what happened and when the ride will start again. Sometimes the queuing area needs to be emptied if the error is severe and takes a longer time to fix. In that case, the attraction employees, sometimes together with park hosts, remove people from the queuing area. The operator always has a dialog with management to decide if the attraction should close and how long the delay will be.

The *Liseberg* attractions have estimates of queue times (in minutes) which are set by the attraction employees. The most common way to do this is to look at a guide that shows estimates depending on the length of the queue. Then, the employees adjust the queue time by changing the value on a touchscreen. Some attractions require employees to call in their estimates.

At the end of the day, the attraction needs to be closed. Important to note is that the employees close the entrance to the attraction before the official *Liseberg* closing time. This is to account for the people already in the queue. Everyone in the queue should be able to ride the attraction before it is closed. This process can also be a stress factor for the employees. If they decide to close the entrance too early, visitors can become angry that the attraction is standing still when the park is still open, and if they close it too late, they have to work overtime. Sometimes, people try to sneak into the queue even after the entrance is closed.

Working at the entrance
Visitors have multiple ways to enter the park. The common way is to go to the entrance counters and purchase park admission. Visitors that have purchased tickets online, or have Lisebergskortet (a pre-paid card that gives entrance admission) are able to enter *Liseberg* through the main gates (bypassing the ordinary queue) by scanning their card or receipt. If visitors demand extra service, for example if they have an attendant with them or are a bigger group, they can use the guest service entrance. Visitors can also purchase ride admission and other types of tickets at counters inside the park.

At the beginning of their work day, entrance employees pick up extra change and products (park- and ride admission etc.). They count the products to make sure that they have the correct number and types, depending on the estimated visitor count, before transporting everything to the counter specified on their schedule.

There are two employees in each entrance booth, sitting with their back towards each other and operating an entrance counter on their own. After arriving in the booth, the employee places the products they collected before where they want them, for example on a shelf inside the booth. Then, they log in to a software that handles payments.

When the park opens, guards or the employees working as distributors (handling the exchange register) open the gates. When a guest arrives at a counter, the employee uses the payment software to select the product the guest requests. Then, they activate the card terminal to allow the guest to pay. Finally, they hand out the receipt and the purchased products. It is the employees' responsibility to put on and fasten the ride admission wristband on the person purchasing it in order to prevent abuse. If the guest has *Lisebergskortet* (free entrance admission), the employee registers the card and makes sure the image associated with the card is picturing the correct person. Employees work at intervals and have breaks and lunch breaks throughout the day. While away on a break, they rotate their spot with another employee.

At the end of the work day, the employee registers the day's sales and handles cash. This process can be stressful if the employee did not have time to do it before the park closed.

There can be a big difference between visitors that arrive at the counter already decided on what to purchase, and those that don't know what to buy. Although there are signs that show visitors information about the different tickets, some visitors (especially those visiting *Liseberg* for the first time) had a hard time understanding them. The employee has to explain to the visitors what the different tickets are, and also try to match them to the visitors' needs. A rough estimate was that visitors that already know what to purchase can complete their purchase in about a minute, while those that do not can take up to five minutes. One participant described that about half of the guests are uncertain about their purchase when arriving at the counter.

6.3.2.2 Insights

This section describes some of the insights directly based on the interview subjects quotes. Employees expressed that their experience of a work day is affected by the visitors' behavior and communication. Encountering complaining, irritated, guests results in a large dip in the emotional experience curve. On the other hand, guests that were perceived as more positive than average created a positive experience. Employees described that negative guests could be a problem at the entrance, when guests had to stand in line for long before getting into the park and at the attrac-

tions if the attraction for example breaks down or the lines are slow. Interesting to note was that while attractions breaking down might be a negative experience for guests, employees viewed it as positive since they get a chance to relax. Another positive aspect was the interaction with other employees, for example at the morning meeting and at lunchtime.

Processing long queues are generally not perceived as stressful for the employees. They are aware of their optimal work pace and try to keep it to the best of their abilities. Furthermore, the speed with which the queue can be processed is dependant on factors outside of the entrance and attraction employees control. Attractions have cycle times, e.g a roller coaster cart departs and a new one arrives, limiting the throughput, and the entrance employees depend on park hosts directing the crowd to the counters. However, one employee described that on attractions with fast throughput, the work tempo can be high which results in stress.

The interviews provided further insight into guests' queuing behaviors and perception of queuing at the park.

Complaints
At the entrance, many visitors complain to the personnel about the prices and queuing system. Families with kids are usually the group of guests complaining about queuing time, appear stressed and want to get into *Liseberg* quickly. The participants expressed that as lines grew, guests were perceived as more stressed and the number of troublesome interactions increased. Finally, the guests also affect how fast the attractions are running. If guests were fighting in the queue or complaining about something, the throughput would also be lower.

Choice of a queue at the entrance
If guests see that one counter is free and another has a line, people usually go to the one with a line because they know this specific counter is open. After doing so, they still complain that lines are too long. Furthermore, the layout of the current entrance creates a bottleneck where people stand in long lines at one side of the entrance, while the other side has open counters without lines. Currently, the park hosts try to direct people to the free counters.

Express-Pass
Liseberg never intends to break companies of people when seating them in an attraction. This means that if a large company is present in the ordinary queue, the *Express-Pass* queue might be put on hold. Even so, employees expressed that visitors with *Express-Passes* rarely complain because they still get to skip the long waiting time of the ordinary queue. Since guests have to keep track of the time slots themselves, there are situations were a guest arrives at a later time, but still want to get in. Employees usually let them in to be nice.

6.3.3 Service blueprint

The creation of the *Service blueprint* was based on stakeholder research with the *Liseberg* management and *Liseberg* employees. Together with insights from the guest research, the key actions of guests and employees were distinguished, connected and included chronologically, illustrated in figure 6.10 and 6.11. Added was also the physical evidence for each step and the internal communication which was displayed as the backstage category. Additionally, the support systems used were also added, according to the method of *Service blueprinting*.

The time scope starts with a guest visiting *Liseberg's* website and planning her visit and ends after the first attraction ride at *Liseberg*. The scope was limited to include all opportunity and problem areas that were found during the research with management, guests, and employees. The final blueprint was validated with one of the *Liseberg* employees during an interview. According to the interview subject, the blueprint covered almost all relevant steps and some minor actions were added to front stage and physical evidence as a result.

The aim of developing this diagram was mainly to reach an understanding of the current system as well as employee and guest actions and interactions. This can further be used together with *User journey map* to localize pain points, organizational opportunities and work flow improvements. Also, it can act as a document for concept evaluation, to study if a concept fits in and would improve the current system.

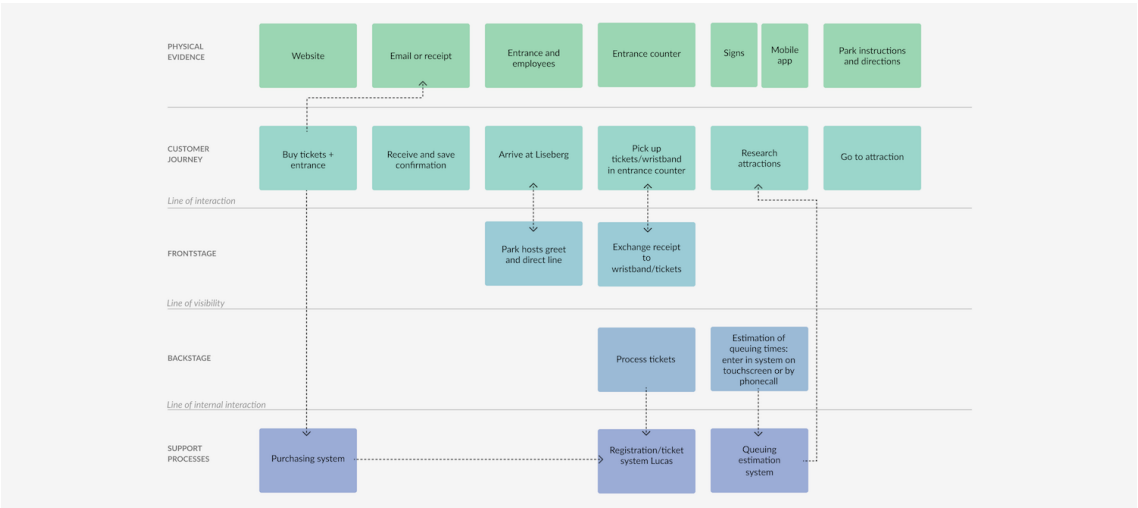


Figure 6.10: Blueprint part 1, Initial steps for guests planning and arriving at *Liseberg*

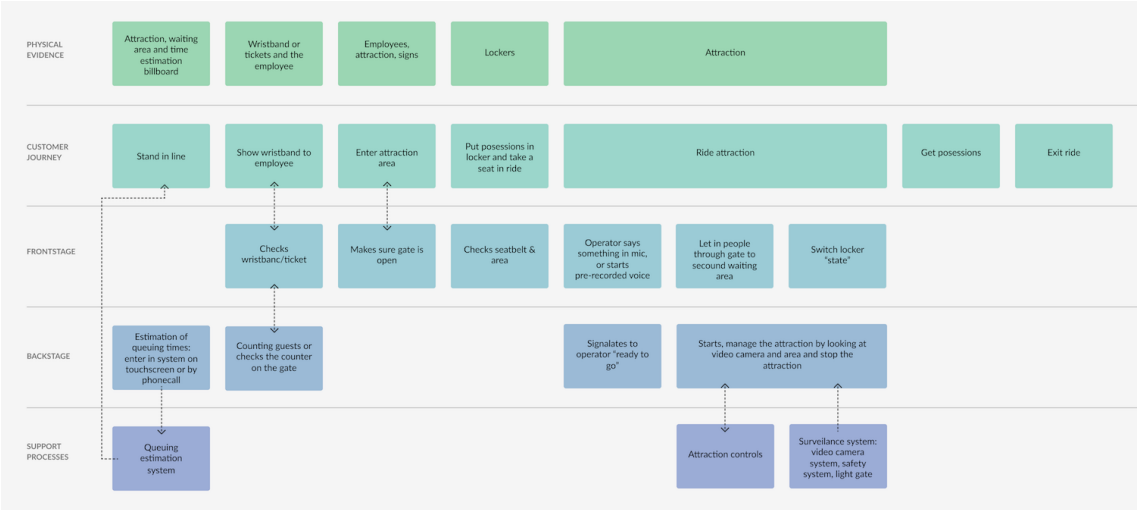


Figure 6.11: Blueprint part 2, Later steps for guests visiting *Liseberg*

6.4 Synthesizing research

The research provided broad, general information about the *Liseberg* experience from both guests-, employees- and management perspectives. The next step of the process was to analyze and summarize the results of the research to create a foundation for ideation, concept development, and concept evaluation. In order to aid ideation and development, the research findings were synthesized through a *KJ analysis* into a set of focus areas and design opportunities. Furthermore, the research was also collected in an extensive document translating findings into design principles and requirements to provide a platform for evaluation.

6.4.1 Focus areas and design opportunities

The aim of this process was to find and define themes summarizing research from multiple phases, as well as produce one or several problem statements that could be communicated, discussed and validated with stakeholders. This was done in order to make sure that any solution developed in future phases were relevant to real business goals.

The initial step of the synthesis process was to conduct a *KJ analysis* (Section 4.4.1) of the collected material. The summarized research material, from both literature review and interviews, were printed out on paper and placed on a table. Themes that correlated, for example by describing the same part of the problem domain, were then grouped together. This process was iterated until no more meaningful groups could be identified, or the notes left could not be placed in existing groups. Each theme was given a headline that described what it contained. The themes summarizing the complete research is presented below.

The importance of social interactions
Social interactions, specifically guest to guest, is a big part of people's motivation

to visit *Liseberg*. Furthermore, social interactions between the people at *Liseberg*, guest-guest, guest-employee, and employee-employee, affect all involved parties overall experience. Positive social interactions improve the *Liseberg* experience in general, and the queuing experience in particular, by creating pleasant moods.

Unfavorable distribution of guests
Some time periods and attractions attract more guests than others. If the distribution of guests over time, as in seasons, months, weeks and weekdays were more even, the total amount of guests at the park at a given time would be lowered. If the distribution across attractions would be more even, the waiting lines to the most popular attractions would be shorter. This would give guests a better queuing experience due to shorter waiting times. It would also provide *Liseberg* with increased business opportunities since the guests would have more time to roam the park rather than be stuck in queues.

Mismanaged expectations
The expectations of the waiting times affect the guests' experiences during waiting. *Liseberg* is unable to provide accurate estimations that creates realistic expectations. The result is annoyance among guests, as they have to stand in line for longer than anticipated.

Physical discomfort
Physical discomfort such as lack of space, crowding, and invasion of personal space affects the guests experience negatively. These problems are often manifested at peak season where a lot of people visit the park and the lines are long.

Lack of conceptual models
Liseberg is unable to present guests with the correct information at the correct time. This prevents guests from having a clear conceptual model of how to queue effectively. The result is longer waiting times and a higher amount of agitated and annoyed visitors since the operational efficiency is lowered.

Negative emotions as a result of queues
Waiting in line makes some guests bored, and the boredom can turn to anger if their "invested" time does not give any results, for example if an attraction breaks down. This is strongly related to the *Perceived monetary value* theme.

Perceived monetary value
Guests feel that a visit to *Liseberg* costs a lot of money. The queuing experience at *Liseberg* affects the guests' perceptions and opinions of getting their money's worth. Guests feel they waste their invested money by standing around in line without riding.

The importance of distractions
Guests try to use several tactics to distract themselves to prevent boredom when waiting, for example, talking to friends or looking at their smartphones. Guests

explore ways to be occupied.

The themes were used to create a number of *Insights statements* (Section 4.4.2), brief sentences that summarize the insights the theme provide. Finally, the *Insight statements* were taken as is, combined, or modified, and used as base for multiple *How might we...* questions (Section 4.4.2). The intention of these questions is to provide a clear problem that can be approached during the brainstorming. All *Insight statements* and *How Might We* questions can be found in Appendix G.

6.4.2 Design principles

This process was performed by collecting all research findings in a single document and transforming it into design requirements. The goal of this process was to create a list of principles for future concept evaluation and potential prioritization of different concept ideas. Also, the collected principles and requirements could be translated into general principles in order to build a foundation for answering the research question.

The creation of the principle and requirement list involved adding all research findings, such as problem or opportunity areas, from both guests-, employees- and management research into a collected list. These areas, together with a description were sorted and organized together. Additionally, each of them was translated into a requirement or a design principle, parts of which is visualized by figure 6.12. A total of 71 principles were identified, without ranking or prioritization. The principles were brief statements preceded by "The solution should be able to..." and concerned employees' and guests' queuing related experiences at the entrance and attractions.

B	C	D	E	F	G
Area	**Problem or opportunity**	**Description**	**Source**		**Design principle / requirement:** *The solution should be able to...*
Queuing (general)					
	Queues creates negative emotions	People feel several negative emotions when queuing, such as boredom, uncertainty, restlessness and lack of motivation.	KJ (contextual interviews)		prevent feelings as boredome, uncertanty, restlessness and lack of motivations for guests standing in queues
		Visitors also feel queues and waiting long times itself is problematic.	KJ (contextual interviews)		prevent queues and minimise objective waiting times throughout the park
	Guests accept some queue time depending on the situation	Visitors accept a varied amount of queue time depending on the situation. For example, novelty (e.g a new rollercoaster) can increase motivation to queue for longer.	KJ (contextual interviews)		utilize or facilitate situations and events that increase the guests motivation to queue (e.g novelty)
	Guest get less for their money (monetary value)	Visitors feel that the waste money if they purchase an expensive ticket and can't experience attractions due to long queues. Visitors strive to get the their money's worth at Liseberg.	KJ (contextual interviews)		make guests feel they get value from the bought tickets independent on current guest intensity and total amount of queueing time

Figure 6.12: Screen shot from part of the design principles and requirement list

The complete document of *Design principles* can be found in Appendix H.

6.5 Ideation

This section presents the ideation phases, where insights from the research were used to generate a number of design solutions.

6.5.1 First iteration

In this section, the project's first iteration of *Brainstorming* and idea evaluation is described. The brainstorming sessions were based on some of the *How might we* questions created in section 6.4.1. Several questions were used in each of the brainstorming sessions in order to explore a wide set of ideas, focusing on quantity.

Brainstorming
The project members conducted a *Brainstorming* session in order to generate ideas and concepts. Each *How might we* question was processed for 1-5 minutes and a set of ideas related to the question were created. Pictures from the brainstorming sessions can be seen in figure 6.13. In total, the brainstorming session considered ten *How might we* questions, which can be found in Appendix G. Some examples are listed below:

How might we...

- improve the queuing experience by distributing guests through social incentives?
- distribute guest better across park attractions?
- improve the queuing experience by providing information that helps guests make optimal decisions in regards to queuing?

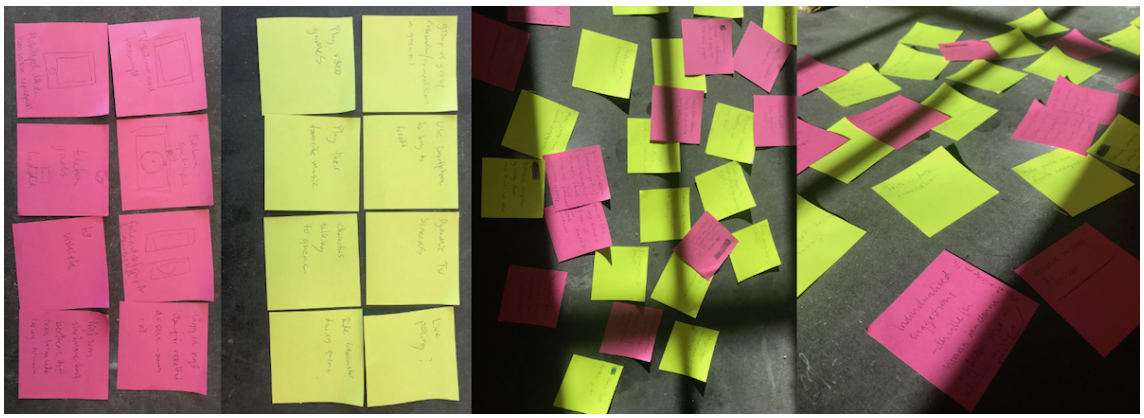


Figure 6.13: Photos from the ideation process, first iteration

The authors collectively selected five ideas among those generated. These were considered to have the most potential, both regarding their scope, and ability to solve problems identified through research. These ideas were the base in the further development of more complete concepts, described in the next subsection.

Initial concepts
In order to develop the ideas from the first brainstorming sessions, the prototyping method *Sketching* was used. This was chosen to enable exploration of potential alternatives within the concept, define sub-solutions and to identify potential problems with the concepts. Also, these were used to communicate the ideas internally in the project team, and later also for communication externally to business stakeholders. Each concept was relevant to one or several of the problem dimensions

identified through synthesis. In general, the concepts either tried to make waiting meaningful by introducing pleasant distraction at the queues, or tried to make it easier for guests to plan their visit to avoid queues and waiting time. The sketches and description of each individual concept can be found in Appendix I.

Stakeholder evaluation
The five concepts, and the research supporting them, were presented to *Liseberg* management in order to gather feedback on their relevance and ability to solve the queuing problem. Each concept were described using a *what*, *why*, *when/where* structure. The dimensions of research relevant to the concept, and the sketches were also presented. After the presentation, an open discussion about the research, concepts, and their validity was held. The sentiment was that none of the concepts, in their current form, should be developed further. However, some aspects of them could be modified and further developed into new solutions.

During the evaluation, important problem areas and components with improvement possibilities that the management faces, were discussed. For example, the data *Liseberg* currently collects, and utilizes, is very limited, and not utilized to its full potential. The guest count information on their website is based on arbitrary estimations without connection to real-world data. Gathering additional information from an additional internal and external sources, and using it to improve the *Liseberg*-guest communication was therefore seen as one area with large improvement possibilities. *Liseberg* also reiterated their goal of updating and improving their current *Express-Pass* system, as well as the importance of distributing guests more effectively across seasons, days and attractions. Several potential solutions were discussed. For example a virtual queuing system, replacing queues with open waiting areas, "pay-for-what-you-use" services, and wristbands that let visitors pay after their visit. The discussion was used to guide the upcoming brainstorming.

6.5.2 Second iteration

The second iteration of ideation was based on the input from the stakeholder evaluation, and included a similar brainstorming and concept development phase.

Brainstorming
The brainstorming process involved both traditional brainstorming and the method *Crazy 8* (Section 4.5.1). This brainstorming session, conducted by the project members, was based on the areas identified during the stakeholder evaluation: virtual queuing systems, "pay-for-what-you-use" services, and wristbands that let visitors pay after their visit. Before starting the brainstorming sessions, these areas were translated into different *How might we* questions (Section 4.4.2) in order to focus the brainstorming. Some of the *How might we* questions used were:

How might we...

- restructure the current *Express-Pass* system in order to distribute guests across seasons?

- collect and present information to help guests make decisions that minimize their time in queues?
- create a feeling among guests that they get more value out of their money?

Four concept areas generated during the second iteration of brainstorming are presented below.

Concept area 1: On-demand riding
This concept area aims to distribute guests across seasons by changing the behavior of the local market. It aims to make guests that spend long days at *Liseberg* during peak season, instead have short spontaneous visits during the pre- and postseasons. By doing so, the number of people in the park, and consequently the overall waiting times, would be reduced.

The concept area is based on a hypothesis that guests' general visit time are affected by *Liseberg's* current system. Visitors stay long in the park and ride a lot of attractions to try to get out as much value as possible out of their ride admission wristband. Solutions targeting this area aims to create an easy way for the local market to visit Liseberg spontaneously, for shorter visits, and still feel they get good value from the money spent. Figure 6.14 shows a few variations on how this can be achieved. The concepts include new pricing models of where guests can book specific rides during a specific time, buy entrance and attraction package for discounted prices etc.

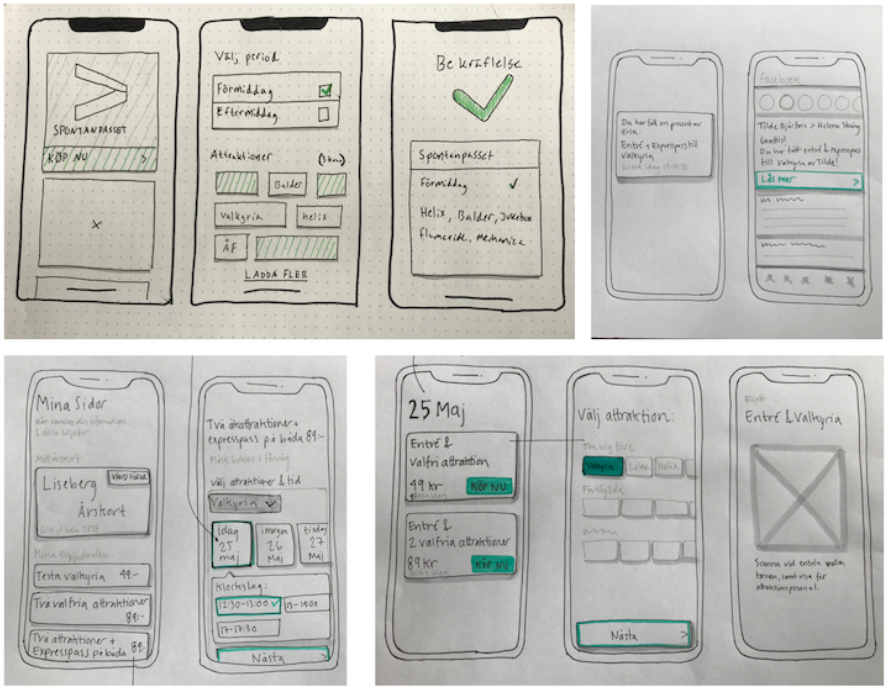


Figure 6.14: The concept On demand riding

Concept area 2: Virtual queues
The concept of virtual queues aims to replace all, or parts, of the physical queues with a system allowing guests to stand in queues through digital devices, such as personal smartphones. This would allow guests to free up time from physically standing in line and fill their time while queuing with other, more meaningful activities. This concept has potential to be profitable for *Liseberg* since freeing guests from physical lines could increase their consumption at the park.

Figure 6.15 displays some examples of how to conceptualize virtual queues. The guests should be able to choose between the different attractions, join one of the queues and be able to see line placement and estimated time left. Moreover, the concept will need to address the fact that guests usually visit *Liseberg* in groups, hence have a system of managing group or family members and handling several people queuing to different attractions.

Figure 6.15: The concept Virtual queues

Concept area 3: Improved information
This concept area aims to help guests form a better understanding of the differences in guest intensity and waiting times across seasons, weeks and days by improving the communication of information from *Liseberg* to its potential guests. Consequently, this might lead to an improved distributions of guests, as it would be easier to identify and avoid high intensity periods of time. Furthermore, providing better information might also make guests manage their expectations. If they are informed that their planned visit is a high intensity day, they might be more accepting of crowds and extensive queues. As figure 6.16 displays, this can be done by visualizing different comparisons and suggest alternative visit times based on the guests' intentions and interests.

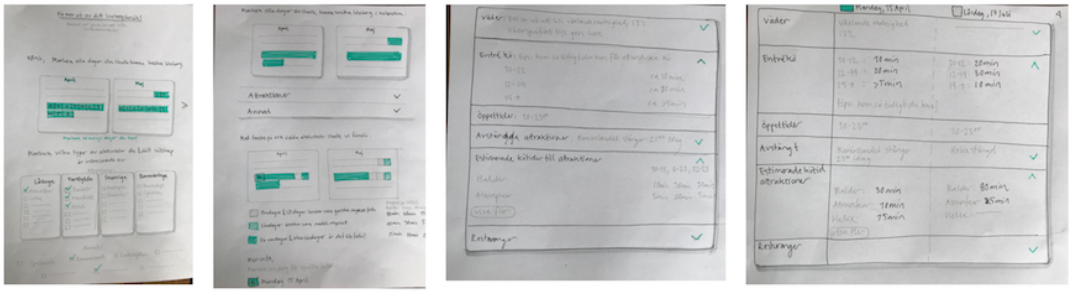


Figure 6.16: The concept Get more out of your visit

Concept area 4: Pay after visit
This concept area is also based on the hypothesis that guests that purchase ride admission wristbands want to get as much value as possible from their purchased tickets. This means that they stay longer at the park to try to ride as many attractions as possible. If guests had the opportunity to only pay for the services they use during a visit, they might feel less pressure to get their money's worth. Guests might have less negative sentiments towards queuing since they do not "lose" money by standing around not riding. Furthermore, making it simple and cheap to visit *Liseberg* and only ride a few attractions might make guests from local markets more inclined to visit *Liseberg* during pre- or post season (e,g after a work day). Consequently, they are less likely to visit again during peak season.

One way to implement this is to give guests wristbands used for admission and payments. Guests can scan the wristband to pay for attractions, wheel of fortunes, games and other forms of services at the park. At the end of the day, the wristband is returned to the staff, and the guest pays the accumulated amount. A supporting app can be used to keep track of how much money is being spent. Figure 6.17 visualize the app part of the service.

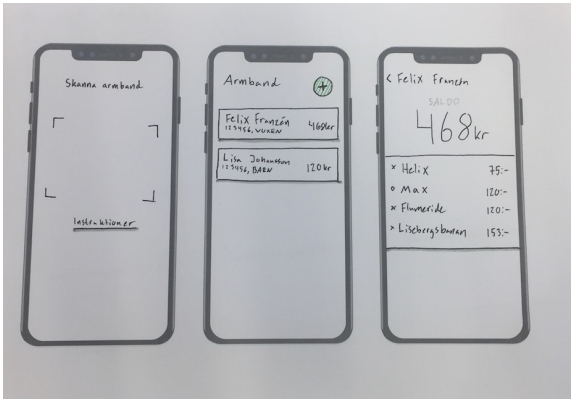


Figure 6.17: The concept Pay after visit

6.6 Concept evaluation and selection

Several methods, all described below, were applied in order to choose which of the four concepts to move further within the process.

6.6.1 Stakeholder discussion

A new discussion with *Liseberg* stakeholders was conducted to ensure the concepts satisfied their business goals. This was especially important since the concepts generated after the second brainstorm required considerations about business critical aspects such as payments. The discussion highlighted benefits and challenges with each concept and guided the final concept selection. All concepts were perceived as improvements of the current system, however, some would be easier to implement than others.

Improved information would drastically improve the *Liseberg* to visitor communication and can easily be integrated into the current web and application platforms. In some regards *On demand riding* and particularly *Pay after visit* were perceived as difficult to practically implement since it would require revamping the current payment model. Finally, *Virtual queues* had the most positive reception. *Liseberg* stakeholders described that it was in line with both their short- and long-term goal and can be effectively implemented in their existing operations. Due to the implications of scope with the *Pay after visit* concept, it was decided to be excluded from further discussions and evaluation from this point.

6.6.2 Interviews with *Liseberg* visitors

Due to the wide scope of the previously conducted research, it was considered important to conduct more concept-specific research with visitors at *Liseberg*. This was done to gain an understanding of how the concepts would be met by *Liseberg* guests, as well as verify any hypothesis related to the concepts.

A semi-structured interview guide were created to address these matters. The scripts can be found in Appendix J. The interviews were conducted at *Liseberg's* gaming house with five parents, both male and female. As presented in the interview guide, the questions were divided by each concept. Among the five participants, two interviews were conducted about *On demand riding*, two about *Virtual queues*, and one about *Improved information*. Each interview were recorded and lasted 10 - 20 minutes each.To analyze the interviews, the recordings were transcribed into a word processor. Similar to the analysis of previous interviews, the transcriptions were then looked over thoroughly and relevant statements were highlighted.

The result was a number of insights related to the concepts validity, and confirmations for the various hypothesis the concepts were built on. For example that guests increase the length of their visits to get their money's worth, and that they

value spontaneity over planning their visits. Insights from the interviews guided the subsequent concept selection.

6.6.3 PUGH-matrix

In order to evaluate the concepts, a *PUGH-matrix* (Section 4.6.1) was used for the concepts *Improved information*, *Virtual queues* and *On demand riding*. The previously developed requirement list (Section 6.4.2) was used as a list of criteria. Before starting the evaluation, the original 71 principles were looked over. Any principles deemed unclear or duplicate were reformulated or discarded. The final list of constituted of 53 different requirements. Each criterion was then weighted based on previous research and how important the project members perceived the criteria to be. The distributions of weights were slanted upwards, with 28 of the criteria being ranked as important with a weight of 4 or 5. Figure 6.18 displays a piece of the evaluation. The full matrix can be found in Appendix K.

To be able to compare the concepts' validity, each concept was awarded a total score. The sum of each criterion's weight multiplied with the concept's point for that criteria. The maximum score achievable was 184 points. The results from using the method was 70 points to *Improved information*, 72 points to *On demand riding* and 65 points to *Virtual queues*. Since the ranking did not show large differences in how well the concepts fulfill the criteria, it was decided that none of the concepts were to be discarded solely because of a lower score.

	Finalised list of requirements	Weighting (1-5)	Concept 1: Personalized information	Concept 2: On demand rider	Concept 3: Virtual queues
1	prevent feelings as boredome, uncertanty, restlessness and lack of motivations for guests standing in queues	4	0	0	1
2	Reduce the objective waiting time at **attractions** for a guest	4	1	1	1
3	Reduce the perceived waiting time at **attractions** for a guest	5	0	1	1
4	Reduce the objective waiting time at the **entrance** for a guest	2	1	1	0
5	Reduce the perceived waiting time at **entrance** for a guest	3	0	0	0
6	utilize or facilitate situations and events that increase the guests motivation to queue (e.g novelty)	2	0	0	1
7	Make guests feel they get value from the bought tickets independent on current guest intensity and total amount of queueing time	4	0	1	1
8	Allow the queueing to be filled with meaningful time	4	0	0	1
9	Validate quality and attract guests to the park	1	1	0	0
10	Validate quality and attract guests to individual attractions	2	0	0	0
11	be applied without decreasing the ability for customer to consume at the park	4	1	1	1

Figure 6.18: A piece of the *PUGH-matrix*

6.6.4 Final concept and further delimitations

Taking the collective results from user research (Section 6.2), stakeholder research (Section 6.3), and concept evaluation (Section 6.6), *Virtual queues* was selected as the concept area to move further with. The concept had a high potential to

positively impact the queuing experience and had the ability to be incorporated in current attraction operations, while also being defined enough to be completed in the scope of this thesis project. Although *Virtual queues* received the lowest amount of points in the *PUGH-matrix* (Section 6.6.3), the difference between its and the other concepts' scores compared to the total score were only 1% and 2.7% respectively, which was not seen as significant. Furthermore, the business stakeholders' feedback (Section 6.6.1) was regarded as highly important to make sure the selected concept was in line with short-term and long-term business goals, and could be realistically implemented at the park. Consequently, their positive reception of *Virtual queuing* influenced the selection process in favor of this concept area.

The users' interaction with the virtual queuing service was not necessarily restrained to a specific platform. Although the previous visualizations of the concepts focus on virtual queues accessible through a smartphone application, it was not out of the question to consider other platforms such as static installations at the park or a desktop web page. During the discussions with *Liseberg* stakeholders, it was revealed that *Liseberg* is working on a new smartphone application for other parts of the park experience. Because of this, it was decided that the virtual queuing concept developed in this project could be developed in line with the new application. It is important to note that the application is ultimately not the only part of the virtual queuing service. Physical props such as the ride admission wristbands, signage at the attractions and the wristband scanner managing attraction entrance are also vital parts of the user's experience Although the prototyping process described in the next section primarily concerns the smartphone application, these physical props, their limitations, and possibilities were considered important when developing and testing the service.

6.7 Concept development, phase 1

As the concept area was decided, this section continues with describing the methods conducted in order to develop the concept.

6.7.1 Description of service concept

The specific details of the service were continuously iterated and improved simultaneously as the development of the wireframes for the smartphone application. Before starting the process of designing the smartphone application, decisions and consideration about several parts of the complete service had to be made. These are presented below.

The idea and current system of *Liseberg's Express-Pass* system was planned to be kept. The service were supposed to be limited to the ride attractions that currently have the express pass systems, due to the fact that these attractions already have a second line system in order for people skipping the regular line. This involves the following attractions: *AeroSpin*, *AtmosFear*, *Balder*, *FlumeRide*, *Kållerado*, *Helix*,

Loke, *Lisebergbanan* and *Mechanica*.

The virtual queuing system could use the QR code scanners that are already in place for the *Express-Pass* system, and would then only require a small change in the wristband design. All the wristband needed to be printed with a unique QR code, not only the ones that were pre-ordered or bought online and picked up at *Liseberg*. This would be necessary for the virtual queues to be self-sufficient and operational without an employee. The attraction entrance would work similar to how the *Express-Pass* system works today, where the guests scan their wristband during their given time slot in the QR scanner, and are then let into the attraction by the machine.

The virtual queue time was decided to be based on the current queuing time, hence there would be only one line, mixed with people standing in the physical and virtual line. The idea was to have no limitations in how many guests that could join the virtual queue, since it would work completely as a regular line. Hence, the expected waiting time at the attraction and in the mobile application would be the same at any given time.

Except the updates described below, *Liseberg* would have to create marketing material and information regarding this new service to display on their website and on social media. Also, its personnel would have to be informed and educated in how the service and the mobile application works. Except for development and installations of virtual queuing stationary service points, some other updates inside the park would also be necessary. This could include switching signs from *Express-Pass* to *Virtual queuing* at the affected ride attractions.

6.7.2 Requirements and framework

A subset of the *Goal directed design* process (Section 4.1.4) was used to create a foundation for sketches and prototypes of the virtual queuing application. Specifically, parts of the methods and process described in *Chapter 4 - setting the vision: scenarios and design requirements* and *Chapter 5 - Designing the product: framework and refinement* were used to guide the initial concept development process. The following steps were included.

Requirements definition

1. Creating problem and vision statements
2. Developing context scenarios
3. Identifying design requirements

Interaction framework

1. Defining form factor, posture and input methods

2. Defining functional and data elements
3. Sketching the interaction framework
4. Constructing key path scenarios

6.7.2.1 Requirements definition

The first part of the process was to define design requirements; a description of the application behavior and how it meets the users' goals. Initially, a set of problem- and vision statements were created. These describe the purpose of the design by presenting the situation that needs changing, and the objective of the design. The statements should consider both user- and business goals (Cooper, 2014). In this project, the statements provided a summarized view of the domain research, and set a clearly defined vision of what problems the virtual queuing service tries to solve. The following statements were developed.

Problem statement
"During peak season, up to 50% of *Liseberg's* guests are dissatisfied with the experience of queuing to attractions. Guests feel that queuing waste time and prevent them from getting value for their money, which results in boredom, irritation, and annoyance. This counteracts the guests' goal to have an exciting social experience at *Liseberg*."

Vision statement
"The design and implementation of a virtual queuing solution will help users to reach their goal of having an exciting social experience at Liseberg, by allowing them to replace waiting times with meaningful activities as well as positively influence their perception of having an efficient visit."

The next step was the construction of a context scenario. Context scenarios present a persona's typical interaction with the future product or service (Cooper, 2014). Following the recommendations by Cooper (2014), this part of the process was not concerned with specific interaction details. Instead, the scenario described high-level user actions which captured organizational and environmental considerations, as well as the persona's touch points with the service. The result of this phase was a scenario, presented below, that described how the persona 1. *The father Johan*, utilized the virtual queuing system to book a time during a visit with his children.

1. Johan plans his visit by purchasing tickets at *Liseberg's* website for him and his kids a week before the visit. At the end of the checkout, He gets information of how to unlock the virtual queuing functionality in the app. Johan opens the *Liseberg* app and signs into his account.
2. Johan arrives at the park and enters the park through the main entrance. He goes to the ticket kiosk inside the park and collects ride admission wristbands for him and his kids.
3. Johan connects the wristbands to the app in order to manage the virtual queuing for him and his kids

4. The kids decide on their first attraction but Johan notices that the queue is very long. Johan is not interested in riding the attraction and he knows his kids would not be happy standing in line for that long. Johan opens the app and navigates to the virtual queue functionality, his kids are excited to ride the attractions and pulls his sleeve to tell him to hurry up.
5. He finds the attraction the children wants to go to. He books a slot at the attraction for his kids and gets information that they can ride it in an hour.
6. While waiting, Johan and his kids ride another attraction with a very short line. He continuously checks the app to see how much time is left until their time is up.
7. He gets notified sometime before the ride is supposed to start, the app also shows them how to get to the attraction they have booked a time for.
8. Johan finds the attraction together with his kids. There's a short line to get in, but it is under 5 minute which neither Johan or the kids finds problematic.
9. They ride the attraction and exit the attraction area
10. Later in the day, Johan and his kids want to ride a new attraction so they book a spot in the app. The waiting time for the new attraction is 30 minutes. After 25 minutes he gets a notification that the attraction has broken down, he opens the notification.
11. The app tells him what happened and that *Liseberg* is working to correct the issue. He is also informed that he and his kids are able to book an additional spot in another attraction since their current attraction has broken down.

Using the context scenario, a series of design requirements were created. On a broader level, the requirements describe the information and capabilities the persona needs to access in the system to be able to accomplish their goals, as described in the scenario (Cooper, 2014). These were structured around *objects*, *actions*, and *context*. An example of a requirement is "Get notified when you or someone in your company is approaching the end of the virtual queue".

6.7.2.2 Interaction framework

The interaction framework is used to describe the product's high-level information organization and functional behavior (Cooper, 2014). The first step of creating the framework was to define the form factor, posture and input methods of the application. The project members determined that the product should be usable on modern iPhone and Android devices but the prototypes would be designed for an iPhone 8 running the iOS operating system. The choice of platform was motivated by practical reasons since the project members only had access to iPhones. Since the platform are smartphones, the primary input method is the touchscreen. Although the app can possibly be opened and interacted with anywhere and anytime, the usage context was decided to be visitors already inside the park.

Consequently, a set of functional and data elements were defined. Data elements are the various objects represented in the application, for example attractions and users. Functional elements are the operations that can be done or happens in the

application, for example "Get a push notification when it is 10 minutes left to ride the attraction". While the previously mentioned design requirements are high-level descriptions of functionality, presented from the persona's point of view, data and functional elements use a system centered language (Cooper, 2014). The result of the definition process was a collection of information and functionality that should be available in the application.

With the data and functional elements in mind, the project members developed a number of sketches visualizing the application's content and behavior. The sketching process was primarily a communicative tool, were several variations of the application interface were developed in order to collaboratively explore high-level structure such as navigation and information hierarchy (Figure 6.19). The sketching focused on solving a primary problem of how the application should enable users to book and ride attractions together with their friends or family. In order to tackle this issue, several sub-problems were also confronted. For example, how the users should add and manage their company of guests in the application, and what could be the most efficient way for the application to communicate height and age requirements for attractions. Through several iterations of sketching and discussion, the team formed a shared understanding of the application's interface. These sketches were later developed further into digital prototypes, as described by 6.7.3.

Figure 6.19: Example of visualizations developed when sketching the interaction framework

Key path scenarios use the language of the interaction framework to describe the primary, most frequently used interaction the user has with the product. Coopers (2014) suggest that they should be based on context scenarios. Two key path scenarios were identified in this project.

- Using the application to create a group of *Liseberg* guests by scanning each individual's ride admission wristband.
- Using the application to book a spot in an attraction's virtual queue for all members of the group.

6.7.3 Prototyping: first iteration

The goal of the first iteration of prototyping was to create a functional application prototype that allowed users to carry out the two key path scenarios identified in the previous phase. The prototype was then intended to be used in a *Usability test* (see Section 6.8) that explored if the key path scenarios could be performed in a satisfactory manner.

Using the sketches from the previous phase, a digital prototype was developed. Initially, the digital visualizations were created in the form of wireframes representing the application's pages and states through simple monochrome shapes, colors, and typography. Later, when the core structure of the prototype had been decided, the basic elements were replaced with a visual style corresponding to *Liseberg's* existing graphic charter. Finally, the prototype content was made interactive, allowing users to tap elements in the interface to navigate between pages and states. Furthermore, as a complement to the application, simple paper wristbands with a printed QR-code were also created to simulate the ride admission wristbands provided at the park (Figure 6.20). It is worth noting that the application developed in this phase was limited to the functionality described by the design requirements and interaction framework. Although the application *Liseberg* currently were developing would have additional content, the first prototype omitted this functionality in order to solely focus on interactions relevant to the key path scenarios.

Figure 6.20: Paper wristbands used together with the app during the usability testing

Description of the prototype
The first interactive prototype included three flows, the onboarding process, the booking process and the process of editing company. The onboarding flow shown in figure 6.21 and 6.22 displays parts of the interaction flow including the process of signing in and register the wristband of the user and the user's company.

The first screen the user is presented with is a sign in form with empty input fields. When the user successfully logs in, they are met with the second page in figure 6.21. Here, they have two options. They can either scan their wristband and connect it to the application, or they can continue without and hence miss their opportunity to use the virtual queuing functionality. When tapping the "Scan" button, they are presented with page three. Their name is pre-filled and they are now presented with the choice of scanning their wristbands QR code, or manually type in the number on their wristband. If the scanner is used, the QR code will be identified as shown in page number four, and animated down to the input field as in 6.21 page one, and the number will be automatically added in the input field.

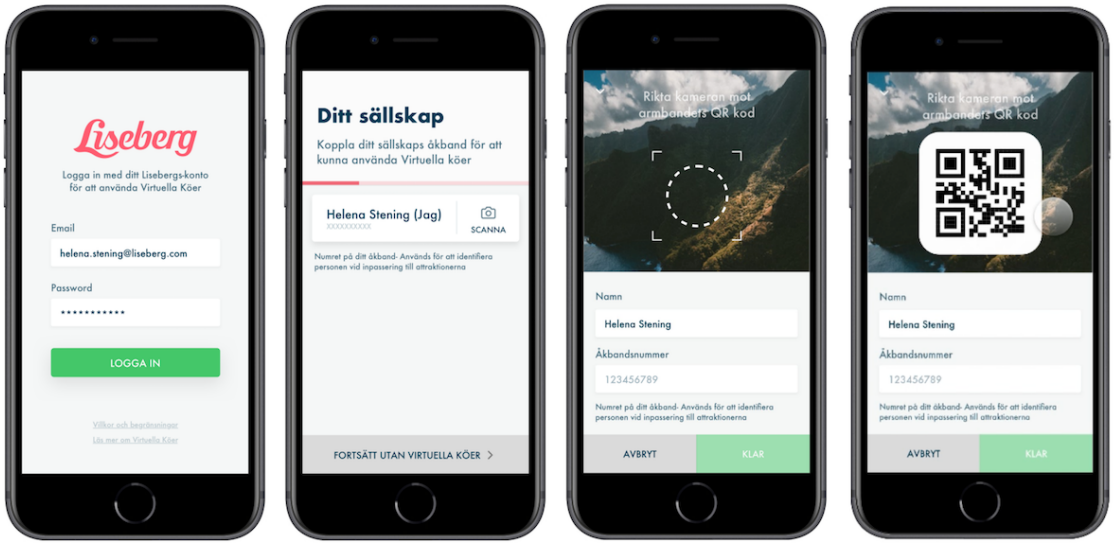


Figure 6.21: Onboarding flow part 1

As all fields are filled in, the "Done" button in the lower right corner is enabled and the user is able to move forward. Tapping "Done" brings the user back to the "Your company" page, which now contains additional information about what type of wristband they have, as well as the possibility to add more people to the company. This is done by tapping the now visible button "Add person", shown in screenshot two. If the user decides to add more people they will perform similar tasks as when connecting their own wristband, with the exception that the name will not be pre-filled. When at least one person is added to the company, the lower button "Register without company" changes to "Register Company" and the user is able to finish the registration process.

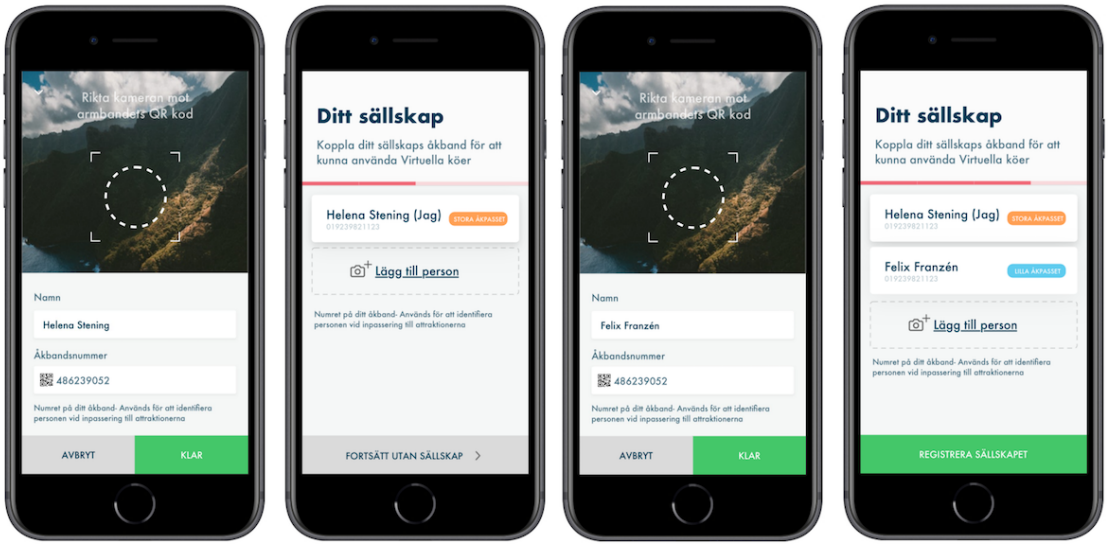


Figure 6.22: Onboarding flow part 2

The second flow that was designed was the process of joining a virtual queue. Which is the first view the user is presented with when opening the application after registration, shown in figure 6.23. This screen displays an overview of the virtual queues and express passes the user or people in their company currently have, as well as a list of attractions. From this screen, the user is able to tap into one of the attractions. If proceeding with that, the user is presented with page number two. This page displays information about the selected attraction and an opportunity to "Book a virtual queue spot", together with the estimated time of waiting. When deciding to book, the user navigates to page number three, where they can choose who of the people in their company would want to be a part of the virtual queuing for this particular ride. All people in the user's company are pre-selected with the possibility to be deselected.

When the user decides to book a spot in the virtual queue, they are brought back to the starting page where the newly added virtual queue appears through an animation. The new virtual queue is added in the overview of their upcoming rides in the top of the screen.

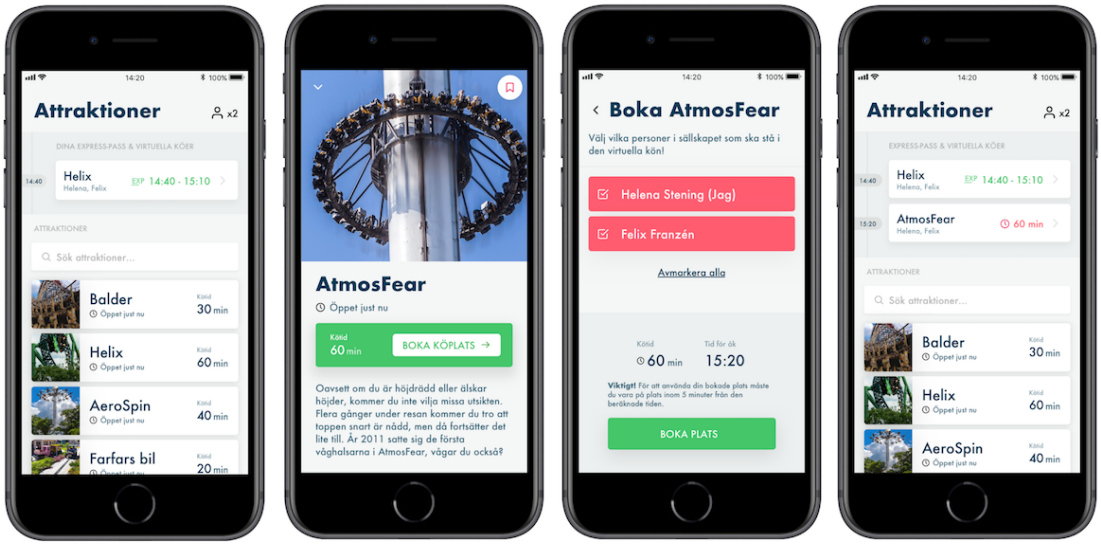


Figure 6.23: Booking flow 1

The last flow that was created was the process of editing the registered company. This functionality is also reached from the starting page shown as page one in figure 6.24, through the icon in the top right corner. If the user taps this icon, they are brought to page number two, which displays the people that are currently a part of their company. Here, the user is able to add more people to the company by tapping the button "Add person", through a similar flow described in the onboarding process and shown on page three. People in the company can also be edited or removed from page two, by tapping on the individual names.

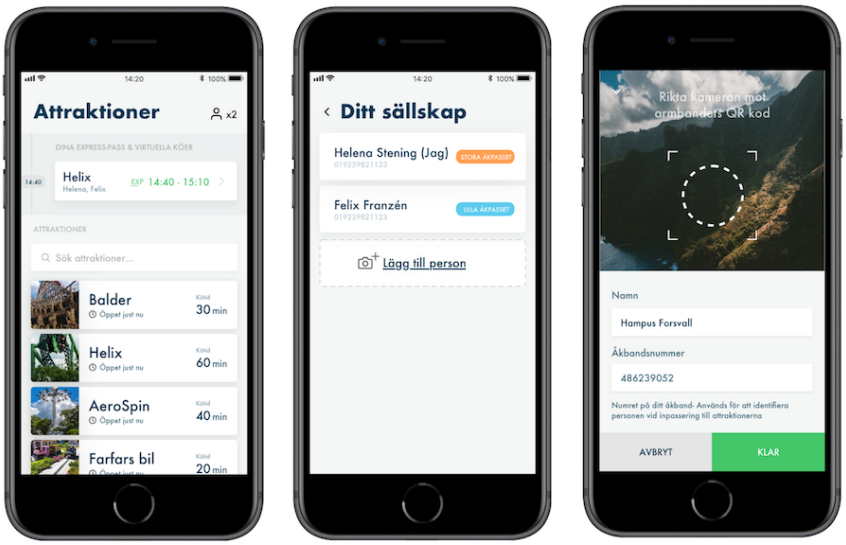


Figure 6.24: Editing company

6.8 Usability testing

In order to find problems with the interactive prototype of the *Virtual queuing* concept, a usability test was planned, pilot tested and conducted. This section describes the planning, execution, and results of the usability test.

6.8.1 Planning

The goal with the usability test was to evaluate the first design for the two key path scenarios identified in the *Interaction framework*; Create a group of visitors by scanning wristband QR codes and book a spot in a virtual queue for an attraction.

In order to capture as many issues as possible, the goal was to recruit a broad set of participants that represented the user group of *Liseberg* guests. To accomplish this, a set of criteria were created. It was decided that the test participants should consist of at least:

- 1 parent
- 1 person >20 years old from the Gothenburg area
- 1 person that has never been to *Liseberg*
- 4 people that have been to *Liseberg* before
- 6 people in total, in order to find as many usability problems as possible while limiting time spent doing the tests per Nielsen's suggestion (Section 4.6.2).

In order to ensure the right participant sample, an initial questionnaire was created to be used at the beginning of the usability test. The questionnaire included questions regarding age, last time visiting *Liseberg*, confidence in using smartphones ans mobile applications as well as how they interpreted the noun "Virtuell Kö" (virtual queue in Swedish).

An initial information text was created, to be read out loud to the test participants. This text was created in order to ensure the participants' agreement of voice recording and emphasized that the test was focusing on evaluating the product and not the participants' ability to use it. Also, it emphasized that if the test participants would feel uncomfortable in any way, hence wanted to stop the test, they should let the researchers know. Furthermore, it encouraged the participants to use the *Think Aloud* technique (Section 4.3.7), in order to capture thoughts and uncertainties during the test.

For the test to be as realistic as possible, the tasks were described as scenarios. As an example, the first scenario after the introduction text was:

"... you also received information that you can download *Liseberg's* new smartphone application to gain access to a virtual queuing service. It allows you to

stand in line in the app instead of physically to some of the attractions. After downloading the app, you are presented with this screen"

To complement the test scenarios, follow up questions and encouragements to think aloud were created to be used throughout the test:

- How would you go about to get started?
- Describe what you see on this screen
- What do you think you can do on this page?
- What would you do on this screen to continue?

A set of issues related to critical parts of the application were set up in order for the test to provide valuable data. Some of these issues are described below:

Research if the test person understands:

- How to book a spot in a virtual queue
- That it is possible to deselect people in the company that do not want to stand in a virtual queue
- When the task is completed, e.g. is it clear that AtmosFear has been added to the list of upcoming rides?

The test locations for the usability tests were decided to be held at different places, to easily recruit test participants and meet their needs in terms of time and location. 7 People were recruited based on the recruitment criteria list. Unfortunately, one of the test participants had to cancel hence the requirement of including "One person under the age of 20 from Gothenburg area" was not reached.

6.8.2 Pilot testing

After the test plan was created, two pilot tests were conducted with people from the *Techno Creative's* office. The participants conducted the test without vital problems and the majority of the planned test script, and the interactive prototype was decided to be kept. However, a third scenario was added, in order to include the functionality of editing groups.

Also, a complementary interview guide was created in order to capture more of the participants' thoughts and questions regarding the design of the prototype. The interview guide was applied in a *Semi-structured interview* (Section 4.3.2), including questions such as:

- What was hard to understand?
- What was easy to understand?
- Was the app different or similar to your expectations of a virtual queuing application?

The whole questionnaire, testing script, and post-test interview questions can be found in Appendix L.

6.8.3 Execution and analysis

Six participants, aged 25 - 32 ($M = 27$), were recruited for the usability test. A majority of test subjects were students, but the recruits also included a postdoctoral researcher and a hospital receptionist. Every one of the participants, but one, had previously been to *Liseberg* during the summer season. All were confident in their ability to use smartphones and applications. Finally, all had a basic understanding of what a virtual queue was, and assumed correctly that it is a queue you do not attend physically. The tests were conducted one by one, at different locations throughout Gothenburg, chosen to be as comfortable as possible for the participants. First, the test participants were asked to fill in the questionnaire and were then given the introduction text read out to them by one of the researchers. All participants accepted the voice recording and understood that they were allowed to stop the test whenever they wanted. After the test, the participants were presented with the post-interview questions. In total the testing and interviewing were about 30-60 minutes each. For each test, there were two researchers participating, taking turns to ask follow up questions.
The usability tests were transcribed and interesting quotes and thoughts from the participants were collected in a text document, grouped by the scenarios they related to. An overall category was also added, containing quotes not strictly corresponding to a specific scenario. Then, each group were processed independently using the *KJ analysis* method (Section 4.4.1). The themes coming out of the *KJ analysis* were translated into a list of insight statements, where each theme corresponded to one or several insights. A summary of these is found in 6.8.4. Additionally, design improvement suggestions were developed based on the insights. These suggestions were created to act as a basis for the second design iteration of the prototype, presented in 6.9.2.

6.8.4 Results

Below, the identified categories from the *KJ Analysis* are listed and explained.

Creating a company
During the first task of the test, the participants were asked to register a personal wristband and the wristband of people in their imaginary company. Some participants did not expect to manually provide a name when adding a person to the company. The scenario for the task described that they had purchased tickets online. The participants assumed that the person's name would be filled automatically by utilizing information from their purchase. One participant hesitated to add the full name of her imaginary child due to privacy concerns. Some participants preferred to manually enter the wristband ID rather than allowing the camera to scan the QR code on the band. One participant suggested that certain words in the prototype

should be re-phrased to be easier to understand. They also had ideas about using space on the wristband to guide the user in how the wristband and the application were supposed to be connected.

Booking
The second task asked participants to join a virtual queue together with their previously registered company. All participants managed to successfully join a virtual queue, and understood when they had finished the task. However, some participants expressed that they would like to choose the ride time themselves, rather than being provided with a time.

In the tested prototype, the ride time was visualized as a countdown presenting the time left until they can ride the attraction. Several participants mentioned that they would prefer a time slot rather than a specific time. This would enable a more flexible visit. They also expressed that a time slot would make them more accepting of waiting time at the attraction.

Some participants expressed that it was important for them to keep track of their ride time to not miss their ride time. Others mentioned that they had no problems missing a booked virtual queue spot. Some participants also emphasized that it was important for them to receive clear information about how to enter the attraction area at their ride time.

One of the main issues encountered during the tests was the two cards displaying a booked virtual queue spot, and a booked *Express Pass* time. Participants did not understand how the cards differentiated, why they displayed different colors, or which booking they should go to first.

Other issues encountered during this task were; confusion about the order of the list of attractions, the strange phrasing of the "extend queue time" functionality, and lack of information about how many queues a user can stand in simultaneously.

Edit company
In the third task, the participants were asked to remove a person from their company. All participant successfully completed the task, but some had trouble finding the functionality. These participants expressed that they expected to find the functionality in another place in the app, and that the button lacked affordance. Some participants were hesitant about removing a person from the company. They expressed that the action felt too destructive. Instead, they would prefer to just deselect the person when booking another spot in a virtual queue. Finally, many participants were confused about the relationship between themselves, persons and companies. They speculated if they could be part of several companies at the same time, and wondered who was responsible for managing a company.

General
The participants expressed that they were positive to the *Virtual queues* concept and

the functionality the prototype provided. They also expressed that the application matched their expectations of a virtual queuing service. However, issues regarding virtual queuing through smartphones appeared throughout the tests and post-test interviews. Some participants expressed that the amusement park visit could feel less spontaneous if they had to keep track of ride times while strolling around in the park. Some participants were also concerned about draining their phone battery while using the applications. Finally, some expressed that the service might increase segregation if you have to pay to access it.

The participants believed that families and people with knowledge about smartphones would be the most frequent users if the service was accessible at *Liseberg*. Also, participants mentioned additional features they would like to see in the app. For example information about guest intensity, and suggested activities based on their virtual queue waiting time.

6.9 Concept development, phase 2

Based on the test results, several design changes were made to improve the application's usability. Also, additional input from the business stakeholders was taken into consideration in the re-design. In this section, these changes are described together with a description of a new prototype.

6.9.1 Development of service concept

Based on input from the business stakeholders, it was decided to only use one system for skipping lines. This was done in order to be able to give more capacity to the virtual queuing system, as well as minimize complexity for the users. This meant that the *Express-Pass* system was removed from the service.

After discussions internally in the project group, it was decided that the virtual queue time would not be based on the physical queue time. Furthermore, the virtual queue would utilize the same number of spots as an attraction as the previous *Express-Pass* system. This meant less effect on the regular line and guests not using the virtual queue, but also fewer spots in the virtual queue for guests to join.

Consequently, this would mean that the virtual line and the physical line would not have the same time estimations. This was decided to be fair, since the research suggested that guests accepted longer waiting times if they did not have to stand in a physical line.

The usage of the *Virtual queuing* service was not meant to give users advantages in terms of shortening the waiting time, only the option to not physically stand in the line. This meant that the virtual queuing time would only be based on the physical waiting time in the sense that it would never be shorter, even if all the spots for the

virtual queue would not be full.

This change was done since it was realized that it could be problematic if the physical line were to be very short at the same time as the virtual line were very long. Then, the time estimation could say “3 hours”, but the visible line for the people not using the service would seem very short. This would contradict their mental model of the length of the waiting time. In turn, this could create irritation and a sense of unfairness for the visitors not using the service, especially if they are expecting a short waiting time and are not able to see the long virtual line.

Further, the concept would include an update regarding users personal profile at Liseberg's website, including the option to add users length and age. Also, design elements displaying expected an unexpected breaks were decided to be added together with push notifications reminding or warning the guests in demanding situations.

6.9.2 Re-design of prototype

Based on discussions with *Liseberg* and insights around the new application that is under development, global navigation and tabs for other features they are planning on implementing, were added to the prototype.

For the functionality regarding registration, major changes were decided to be implemented based out of insights regarding *Lisebergs* new application. For example, the on-boarding flow of register wristbands was moved to a feature accessible from the home page. After registration, this access point was changed to display the actual function of joining a virtual queue. This was done in order to access and use the rest of the application without register for or use the virtual queuing feature.

For the user flow of creating a company, it was decided to also add the functionality of automatically couple the wristbands to the user if they were bought online. To make it easier to add wristbands manually, the word "scan" was decided to be switched out and the font of the wristband number to be increased. Also, it was decided to make it possible for the users to add age and length, in order to prevent users from booking attractions they were not allowed to ride. In the scenario of editing a company, it was decided to add information about the relationship between accounts, persons, and companies as well as the possibility to remove a person from a booked virtual queue.

Regarding the booking flow, the way to communicate waiting time, countdown and placement in the line needed to be re-designed and a slot time interval needed to be added. The countdown previously displayed on the virtual queue was replaced with a specific time coupled with information that you had access to the attraction in a 15-minute interval. A "people in queue" number was also added to support the notion that you are standing in a virtual queue. Also, some additions were made

regarding guidance of how to use the wristband when arriving at the attraction, as well push notification reminders. Further, the phrasing and logo for the functionality of extending the waiting time were decided to be updated.

Lastly, adding featured or favorite attractions was discussed as a way of distributing visitors across the park. Also, it was decided to be necessary to add information regarding virtual queuing on *Lisebergs* other platforms, as websites, and social media channels.

6.9.3 Prototyping: second iteration

The goal of the second iteration was to create an application prototype similar to the one in the first iteration, with a higher level of functionality. The prototype was designed to allow the user to carry out the same key path scenarios as the previous prototype. Further, the second iteration aimed to address the issues identified during the usability study, hence include the improvements presented in Section 6.9.2. The goal with the prototype was to test the re-design in one additionally usability test, in order to capture more problems with the concept and to identify potential problems with the re-design.

The circumstances were decided to be different from previous usability test regarding location, test participants, and context, hence the prototype had to support these changes. The goal was to test the prototype in the context of *Liseberg*, and with larger families to meet a more realistic user situation. In order to support many of the situations that could appear in a real situation, the prototype had to be developed to support a wider range of actions, rather than a small set of predefined task. As in the previous iteration, sketching was used in order to develop initial wireframes. Software programs were used to develop the user interface in a high fidelity form based on *Liseberg's* existing graphic charter. Afterward, the interface was made interactive, hence possible to navigate. The prototype was created focusing on allowing the user to perform the key path scenarios, but was limited in functionality otherwise.

Description of the application prototype
The user is able to access the functionality of registering a company's wristbands through the first screen in figure 6.25, by tapping the button "Activate Virtual Queues". After tapping it, the user is presented with the flow of the pages two to five. The interactions for scanning showed on page four, are similar to the design in the first prototype. In this prototype, the user is able to register a wristband on their company without register one for themselves, since both actions are able to be reached from the second screen in figure 6.25. Also, the user is able to register more information about their company, as seen on the third screen. The fifth page displays a scenario where the user has scanned their own and one additional person's wristband. The last page is shown when the registration is completed, which displays a button with "Choose Attraction" to guide the user in joining a virtual queue.

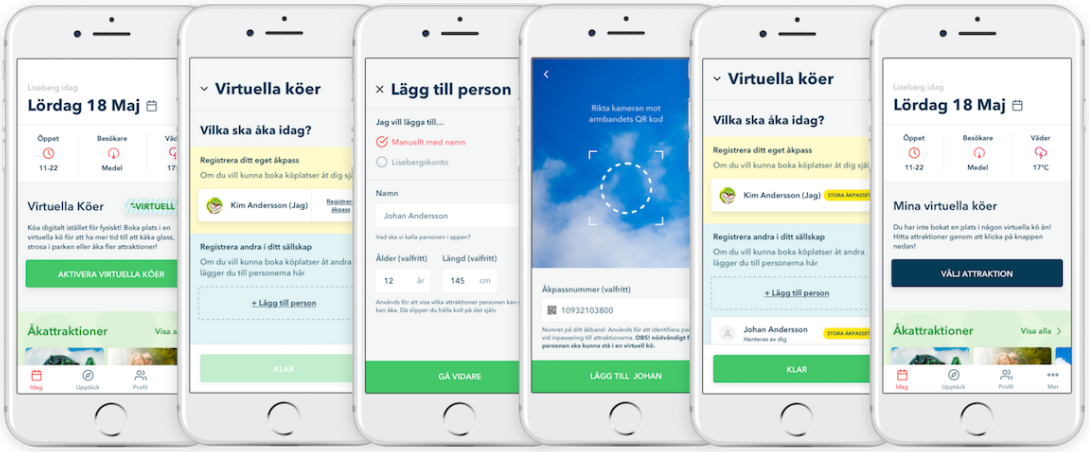


Figure 6.25: The flow of register wristband

In order to join a virtual queue, the user flow was similar to the flow in the previous prototype, visualized in 6.26. The list of all attractions is accessed from the first page (page six in figure 6.25) by tapping "Åkattraktioner" (attractions) or "Visa alla" (show all). In the fourth screen in figure 6.26, information about the time and time slot were added in order to guide the user. The fifth screen shows how booked virtual queues are displayed. In this prototype, as discussed before, the *Express-Pass* system was removed and the application only displays and handles virtual queues.

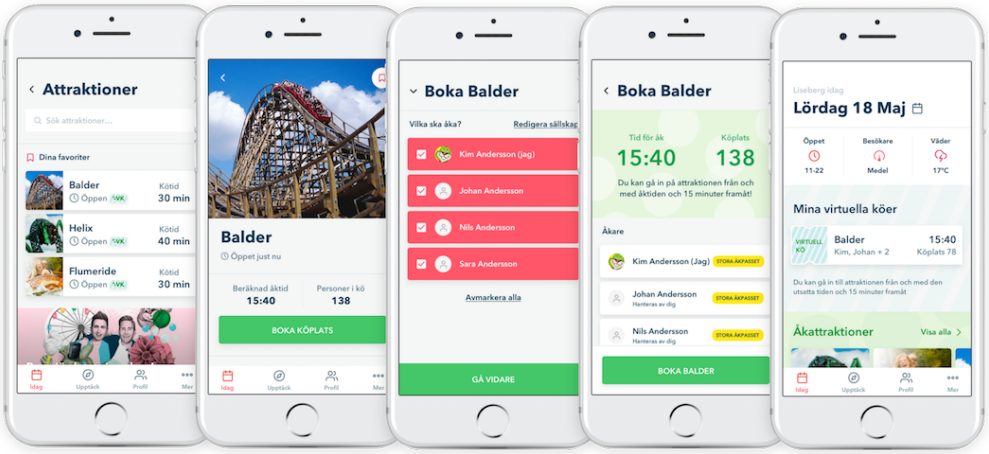


Figure 6.26: The flow of joining a virtual queue

Additionally, the design for a new scenario was developed due to *Liseberg* emphasizing the importance of handling attraction break down, as shown in the first two screens in 6.27. The third screen of figure 6.27 displays another tab, of which the

functionality of managing the profile and company was moved to. From this screen, it is possible to review, add, and remove people in the company, edit personal information as well as receive an overview of the wristbands and digital entry cards.

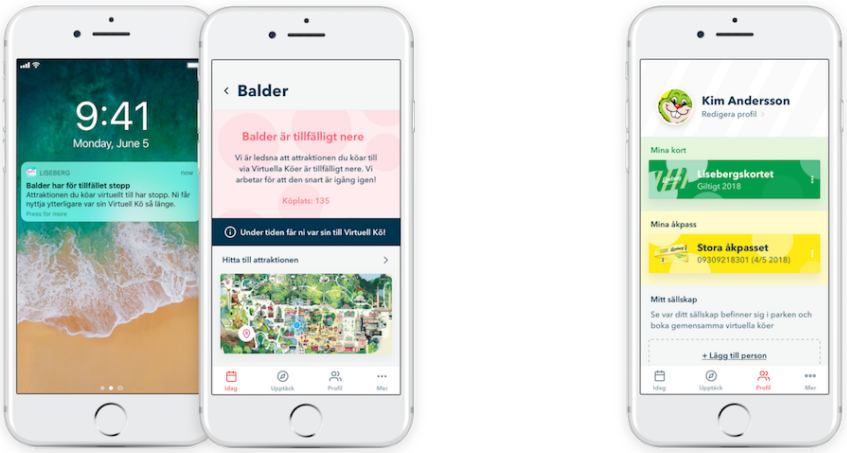


Figure 6.27: Break scenario together with profile tab

6.10 User testing at Liseberg

In this section, the user testing of the re-designed prototype, described in the previous chapter, is presented. The section describes the user testing at *Liseberg* and includes the planning, execution, analysis, and results of the procedure.

6.10.1 Planning

The goal of the user test at *Liseberg* was to evaluate the re-designed app in a realistic context. While the first usability tests (6.8) recruited a wide range of potential *Liseberg* visitors, this tests focused on one of the primary user groups, families. Instead of performing the tests individually, the participants were the entire family in a group setting.

Liseberg provided free entrance and ride admission to participants in order to give candidates an incentive to attend the test. In order to collect as much data as possible, a set of criteria for the recruited families were created.

Include at least:

- 2 groups where at least 1 person has been to *Liseberg* before
- 3 groups with at least 1 adult and 1 child/teenager of which at least 2 people in each group want to ride *FlumeRide*, *Balder* or *Helix*.

To ensure that the participants would be able to provide meaningful insights, a similar questionnaire to the one used to vet the participants of the usability test were created to be used when contacting potential participants. The questions were mostly identical, but the questions related to their last *Liseberg* visit were replaced with a question about the family members visiting *Liseberg* during the test.

The material and structure used to test the selected participants at the park were decided to be similar to the material used in the usability test (as described in 6.8.1). However, some slight manipulations to the tasks were done. A new scenario relating to an attraction breaking down was added, and instead of removing a person from the company the participants were tasked to add a new person. The post-test interview script was identical to the one in the usability test. Since the tests were intended to be done at the park, the time of the test had to be limited to the afternoon and evening due to the parks opening hours

6.10.2 Execution and analysis

Potential candidates were found using a convenience sample, contacted one the phone, and asked questions from the questionnaire. A total of three families in different constellations were recruited. Two of the families consisted of two parents and four children. One family consisted of a parent, an adult friend and an adolescent. The children's ages ranged from 6 to 14. Two of the families were from the Gothenburg area, while one was from Halmstad. All families had previously visited *Liseberg*. Two out of the three families had a basic understanding of the virtual queuing concept before starting the test.

The tests were conducted in a group setting and used the test structure described at the end of section 6.10.1. All tests were held close to *Liseberg's* southern entrance. Participants were introduced to the study's aim and were asked to provide consent to video recording. Then, the researchers presented the different scenarios and asked one of the family members to maneuver the app while thinking aloud. All family members were able to discuss and describe their thoughts. After completing the tasks, the researchers asked the participants questions from the post-test interview script in a *Semi-structured* manner. The total time of the tests ranged from 40 - 60 minutes each. Two researchers participated in each test, one asking following up questions and guiding the test, while the other was recording.

To analyze the results, a similar process used to analyze the usability test was applied (Section 6.8.3). The video material was looked through and interesting thoughts and expressions were noted down. The material was then grouped by each scenario, analyzed using the *KJ analysis* method (Section 4.4.1), and processed into insight statements.

6.10.3 Results

Creating a company
Uses did not have any trouble creating a company after being presented with the scenario. All participants were able to successfully find, navigate and interact with the functionality used to register people and their wristbands to the company.

Booking
The process of booking a spot in a virtual queue for a company followed a similar pattern where users managed to complete the task without encountering any major issues. The participants did have questions and asked for clarifications surrounding some of the activities and information presented in the app. The questionnaire handed out before the test indicated that the participants had a rudimentary understanding of what a virtual queuing system meant. However, it became evident that the participants had different opinions and expectations on more intricate details of the service.

The updated prototype showed the user a specific time they are able to access the ride, as well as informative texts clarifying that it is possible to enter the attraction area the specified time and 15 minutes ahead. The updated app proved to be easier to understand than the previous version as all participants knew when and how to enter the attraction. However, this understanding was not instantaneous as some participants were, at first, confused before reading the clarification about their ride time. One participant did not understand that the service provides a time slot and expressed concern about missing their booked time since it was very specific. The participant also described that by communicating a specific time, guests might be less likely to accept some waiting time when arriving at the queue since it sets the expectations that they should be able to ride immediately. Some participants expressed that it was important for them to make sure they did not miss their booked spots. Because of this, having the ride accessible during a time slot and providing the ability to "prolong queue time" was viewed as beneficial.

At the time of the test, the prototype provided the user with a ride time depending on the length of the physical queue. Two users expressed confusion as they expected the service to allow them to select a time slot later in the day. This was evident during the booking process where they said they tried to click on the ”time to ride” label to change the time. The participants described that for them, this would be beneficial since it allows for more flexibility during the course of their visits.

Users had trouble understanding when and how often they could book a virtual queuing spot. The prototype allowed a person to stand in one virtual queue at a time. This was not explicitly clear for some users as they wondered if you could stand in several lines at once or if it was a cap on the total number of times the virtual queueing functionality could be utilized.

Adding a person to the company
While the process of inputting name and scanning the wristbands was completed

without problems, initially finding the functionality proved to be difficult. Only one of the participants successfully navigated to the profile tab when starting the task. Since this task was performed after the ”booking” task, one participant navigated to their active booking and tried to add the person to the same queue. After the researchers clarified that the new person would like to stand in additional queues later, the participant was able to find the profile tab and complete the task. Another participant managed to find the functionality by navigating into the booking flow and tapping the ”edit company” link on the page where the user is able to select riders for an attraction. These results suggested that users could find ways to add people to the company, but it required exploration of the interface rather than being immediately intuitive. As managing companies is one of the application's key path scenarios, these results were not satisfactory. One participant suggested that an improvement could be to use a more extensive onboarding process where the functionality is described through tooltips or overlays.

The scenario also resulted in discussions about company management. As the participants were families, some expressed that it is important to be able to manage your company effectively. The ability to handle large companies were the members wanted to do different things was especially important since it was a common event.

The presented scenario and task primarily focused on adding people already in the park. However, One participant expressed that it would be beneficial if they would be able to add people arriving later. Because of this, a scenario treating this use case was also briefly tested. When adding a person, the app let the users skip the step of adding a ride admission wristband using a button at the bottom of the scanning screen. The tests revealed that the button was hard to see and that its grey color made it look disabled.

Finally, some participants expressed that the application should clearly communicate ride requirements. This would alleviate the stress of making sure all riders fulfill the criteria. Because of this, they did not find it problematic to provide the new persons' height or age since it could be used in this regard.

Breakdowns
Participants did not understand that a breakdown on one of their attractions gave them an additional spot in another virtual queue. One participant suggested that the app could present the user with a specific attraction and allow them to book a spot in its virtual queue to make it easier to understand. In the event of a breakdown, the participants were unsure about the consequences for their virtual queue spot. After discussing this issue, participants were able to correctly assume that their place in the virtual queue was untouched. Some users were concerned about a situation of a breakdown, where they are given a second virtual queue spot, which could end up at the same time as the first one and cause confusion.

General
The general insights elicited during testing at *Liseberg* where mostly in line with

the insights provided during usability testing. Most of the participants had positive sentiments towards the service, expressed that the app matched their expectations, and were concerned about fairness if the app was only available for a limited group of people. Many also reiterated that having the service accessible through smartphones can be problematic. While some identified the issue with their smartphone's battery life, others expressed that using phones at the park felt incompatible with their intended *Liseberg* experience. They wanted to avoid phones altogether.

Similar to the *Usability test*, the participants expressed that the service would mostly target audiences of families and younger people, well versed in smartphones. Two participants also described that the service might be beneficial to guests wanting to ride a lot, since it would allow them to have a more efficient visit.

In one of the tests, the post-test interview revealed novel insights about potential usage among children and adolescents. Two young participants expressed that the app might be used irresponsibly by their people age group. They suggested that the app needs to provide functionality to counteract such behavior, for example by banning people or being able to accept or decline spot invitations to virtual queues.

6.11 Finalizing concept

In this section, the final decisions regarding the concept and design of the prototype are described. These final changes were based on the user testing at *Liseberg* and inputs from the business stakeholder *Liseberg*.

6.11.1 Development of service concept

After discussions, it was decided to limit the capacity, hence the share, of the virtual queuing spots in relation to the regular queue. This was done in order to take the importance of fairness into account, and minimize the negative effect of increased waiting times for the visitors not using the service. In practice, this would mean that the guests using virtual queues, only could utilize 13 - 20 % of a roller coaster ride seats. The number was based on the share currently used for the express pass system. Initially basing the quota on the current system makes sure that the physical line areas fit the intensity of the virtual queue users, as well as making sure there are no physical lines created by the attraction due to a too high number of guests using the service. The specific share number would have to be tested in a real scenario, and ultimately modified in relation to how many guests use the virtual queuing service.

6.11.2 Re-design of prototype

The final re-design phase was based on data from the tests at *Liseberg*. Since the participants managed to complete the tasks in a mostly satisfactory manner, the re-design primarily strived to improve the applications information and add minor

functionality.

Parts of the information in the interface was made clearer, for example how to use the virtual queuing spot and how many virtual queue spots a person can occupy at a time. The "time to ride" label was changed to an interval of times to explicitly communicate the time slot the attraction is accessible.

Some participants had trouble finding the profile tab when asked to add a person. It was decided that the profile tab should be highlighted when the user completes the onboarding process. The people added in the onboarding process should be animated "into" the profile tab in order to visually connect the profile with your company.

The test also discussed how to handle abuse of the company-functionality. An access point for a new page where users can leave a company and prevent others from putting them in line was added.

The handling of attraction breakdowns was reworked. Guests in the virtual queue of a stopped attraction will keep their spot until the attraction is operational again, but they will not receive any perks such as additional queue spots. Stopped attractions will also not be able to accept new people in the virtual queue. This approach was chosen to reduce operational complexity, as redistributing one virtual queue will result in additional crowding and longer fast-lanes at other virtual queuing enabled attractions. Furthermore, guests in a virtual queue are still better off than guests in the physical queue, as they do not lose their spot in line when waiting for the attraction to start again.

Due to the concept changes regarding shares of virtual queuing spots and regular queuing spots, the interface had to be redesigned to support this. The interface was modified by displaying both the waiting time of the physical lines as well as the virtual waiting times.

The finalized prototype, including the changes described in this section, is presented in 7.1.2.

6.12 Investigating factors

As the thesis used a *research through design* approach (Section 4.1.2), a significant part of the knowledge and understanding required to answer the research question were inferred by performing the practical design activities that constituted the project. Throughout the process, the project members also used a document to collect and summarize explicit thoughts and insights acquired from performing various design activities.

In order to synthesize this knowledge and combine it with explicit results from the research and evaluation, a brainstorming session was held. The authors noted

down thoughts and insights acquired through failed and successful design activities, together with a brief description. The synthesized research findings (Section 6.4) were also looked over and relevant information extracted. Further, the insights were grouped into different dimensions describing the amusement park domain, and problems relevant to address when performing design within it. The result of the process is presented in 7.2.

7
Results

Through performing the design activities presented in this report, two types of results emerged. These are presented in this chapter. First, a description and prototype of a virtual queuing service, applicable to *Liseberg* is described. Then, recommendations that highlight factors that need to be considered when designing a virtual queuing service in the context of amusement parks are introduced.

7.1 The Liseberg Virtual Queue service

In this section, the concept result of the project is presented, namely the finalized development of the *Virtual queuing* service. This section includes a service overview description explaining the main features and the underlying idea of the concept solution. It also includes a detailed walkthrough of the final design of the smartphone application.

7.1.1 Service overview

The final concept, aiming to improve the user experience of queuing in an amusement park, is a *Virtual queuing* service. By utilizing the service, guests are able to stand in line virtually instead of physically. Consequently, the guests can participate in other activities while still queuing to ride attractions. This service has the potential to improve the queuing experience by making the waiting time more meaningful. Instead of waiting in long physical lines, they are free to roam the park and spend quality time with friends and family. Furthermore, the *Virtual queuing* service also allows guests to increase the efficiency of their visit as they are able to ride an additional number of attractions. While standing in a virtual queue, users are free to stand in another attraction's physical line. Increasing efficiency can improve the guest's feeling of getting their money's worth.

The guests' primary touch point with the service is a smartphone application. Here, users can browse and book virtual queue spots at attractions. Furthermore, as a *Liseberg* visit is a social experience, the application also allows groups of people to virtually queue together. This is done with the functionality of registering and managing a company, by connecting a persons ride admission wristband to the application. The application, its behavior, and functionality, is described in detail further down.

The virtual queuing spots are booked using 15-minute time slots. Each slot is restricted to a specific number of guests. When guests book a spot, they will receive the closest available time slot. The time slot approach has the potential to increase the guests' perceived flexibility, as it allows them to handle unforeseen events that might otherwise have made them miss their ride time.

Guests are sometimes hesitant to bring their smartphone with them during their rides. To solve this issue, the *Virtual queuing* service utilizes the existing ride admission wristbands to provide entrance to attractions where the user has a virtual queue spot. When a person receives a spot, their unique wristband id is registered to the booked time slot. The user can then scan their wristband at the end of the fast-lane to access the attraction during their time slot. By using the wristband as an identifier, the guest is not forced to bring their smartphone with them on their ride. Furthermore, if a user books a spot in a virtual queue for another person, the user does not have to hand over their smartphone to provide that person with the ability to enter the attraction.

The service will build upon existing components of *Liseberg's* operations. *Liseberg's Express-Pass* system will be replaced with the *Virtual queuing* service. However, the *Virtual queuing* service will be available on the attractions currently using the *Express-Pass* system. This allows the new service to utilize the present fast-lanes and QR-code scanners. These attractions are *AeroSpin*, *AtmosFear*, *Balder*, *FlumeRide*, *Kållerado*, *Helix*, *Loke*, *Lisebergbanan* and *Mechanica*.

Perceived fairness is an important factor for guests at *Liseberg*. Consequently, the service is available to the park guests without additional fees. A company wanting to use the service is required to have at least one person with a *Liseberg* account, and valid ride admission wristbands for everyone that wants to stand in virtual queues. As the service will be available to a large number of guests, certain limitations are used to prevent delays in the fast-lanes. Each individual registered to a company in the application only has access to one virtual queue spot at a time. The maximum waiting time in a virtual queue is three hours, meaning that all 15-minute time slots for those three hours are full. When the most recent time slot has passed, new spots will open up, available in a first come, first serve manner.

The share of the virtual queuing spots in relation to the regular queuing spots are based on each ride attractions individual capacity, and varies from 13-20 % of the total riding spots. These numbers are based on the current Express Pass system. These numbers are based on the current Express Pass system. This means that there will still be a traditional physical line for guests to queue in, as well as a separate virtual queue to stand in, usually independently from each other. However, the virtual queue will never be shorter than the regular queue, in order to be as fair as possible. Hence, if the virtual queue is not filled up to the time of the regular queue, these spots will be used by the ordinary queue instead.

To exemplify the service's capacity, consider a day where the park hosts 21012 guests (the average number of guests per day in the period 12 June 2017 to 13 August 2017) and all virtual queues are at maximum capacity. In this situation, each three-hour interval would occupy 21,93% of all guests in the park.

The *Virtual queuing* service should share information with other communication channels. Users that purchase tickets online and selects home delivery, currently receives the wristbands with their names printed on it. The virtual queuing service improves this by allowing users that order home delivery to automatically couple the wristbands to themselves or a person in their company during checkout on the website.

Finally, the service is restricted by the park opening hours. Guests are able to book spots in virtual queues from the park opening until it closes. However, in order to make sure there is no person in line when the park closes, the virtual queue will be closed some time before.

In summary, the main components of the *Virtual queuing* service are:

- A user-facing mobile application
- Ride admission wristbands
- The back-end system managing the logic of the virtual queue and companies
- Physical fast-lanes for entering attractions (currently used by guests with *Express-Pass* tickets)
- QR-code readers positioned at the end of the fast-lanes, used to gain access to the attractions.

Other supportive components (although outside of this project's scope) could include physical kiosks that provide access to the service without the use of smartphones and smartphone charging stations.

Service blueprint

The *Virtual queuing* service is visualized in a *Service Blueprint* (Section 4.3.5) and shown in figure 7.1 and figure 7.2. The parts that is new, compared to the *Service blueprint* over *Liseberg's* current system, as shown in section 6.3.3 in figures 6.10 and 6.11, is highlighted with a dark background in the figures. The blueprint describes a situation where the guest is using the mobile application in order to join a virtual queue for an attraction. Additionally, the guest has freed up time while waiting in line for the attraction hence decides to buy some ice cream in the meantime. Another possible situation, not described in this blueprint, would be that the guest is attending another attraction through the regular line with a shorter waiting time, while also virtually queuing. Further, this blueprint also shows that the guest receives a push notification when it is time for them to go to the attraction.

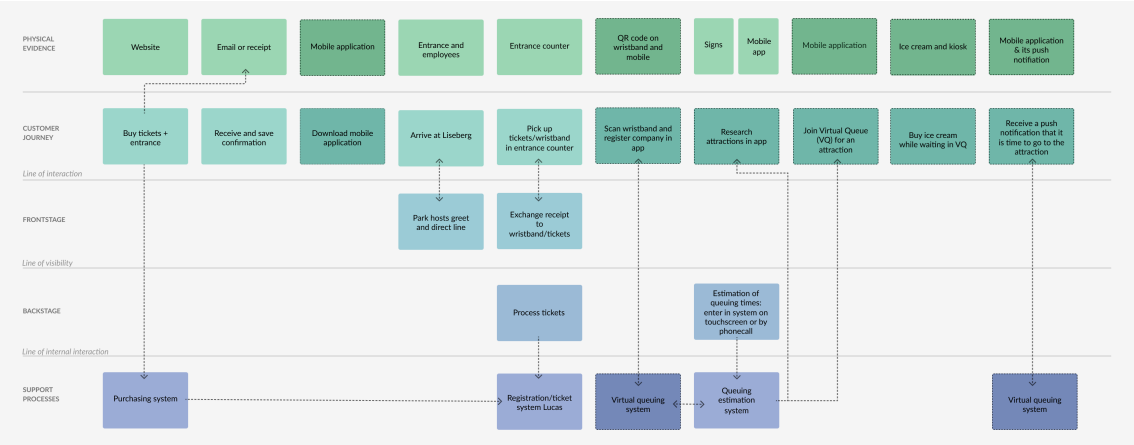


Figure 7.1: The first part of the *Service Blueprint* for the *Virtual queuing* service

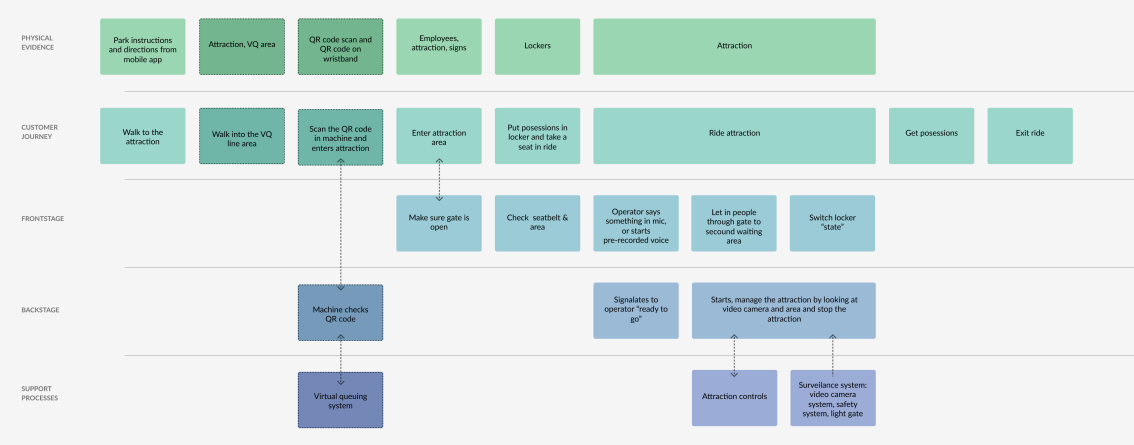


Figure 7.2: The second part of the *Service Blueprint* for the *Virtual queuing* service

Storyboard
In the *Storyboard* vizualised in figure 7.3, parts of the user situation described in the *Service blueprint* is visualized.

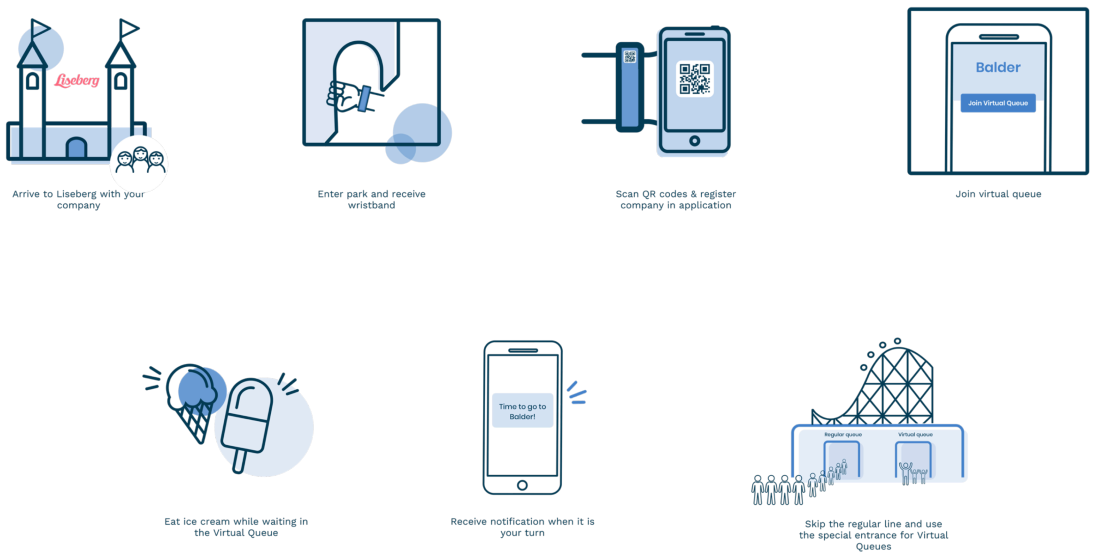


Figure 7.3: The visualized *Storyboard* for the *Virtual queuing* service

7.1.2 Smartphone application

The smartphone application is the guest's touch point with the *Virtual queuing* service. The application is primarily meant to be used inside the amusement park, but can also be involved when users plan a visit before traveling to the park. Important to note is that the application is not stand-alone. Users will still rely on *Liseberg's* other channels for prefaces such as buying tickets. The mobile application is intended to be free, and accessible by anyone using a smartphone running on the iOS or Android operating systems. Below, the application's content and behavior are presented by describing a user's interaction with two key path scenarios.

The mobile applications main navigation, displayed through a bottom navigation bar includes four tabs: *Idag* (Today), *Upptäck* (Discover), *Profil* (Profile) and *Mer* (More). This thesis project focused on developing the tabs *Idag* and *Profil*. *Idag* includes some of the core functionality of the application. The tab visualizes basic information about the current day, event highlights and attractions. Users can also use the tab to access the *Virtual queuing* functionality. *Profil* allows users to manage their cards, ride admission wristbands and company.

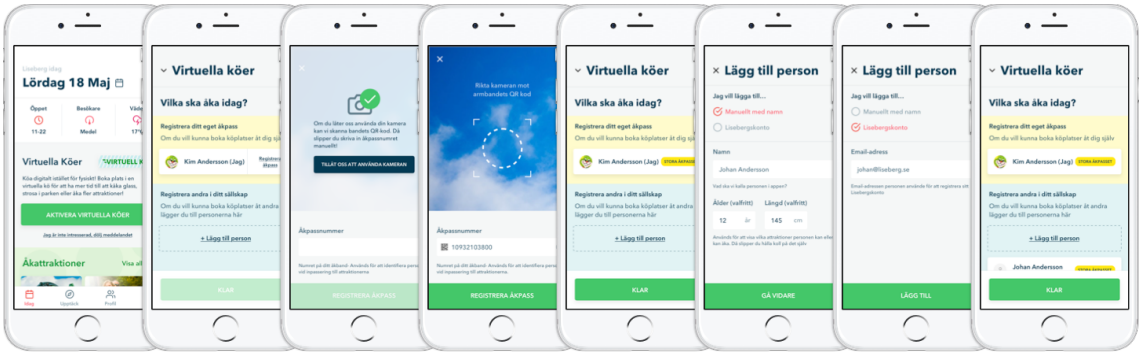


Figure 7.4: The application's onboarding process

The initial flow, show when starting the application, is visualized in Figure 7.4. When a user opens the application for the first time, they will get the opportunity to log in to their *Liseberg* account, or continue without logging in. If the user decides to log in, they will be met with screen 1, displaying a call to action to activate the *Virtual queuing* functionality. If the user activates it, they will face a flow where they are able to register their personal wristband and create a company of guests (screens 2 - 7). Registering a wristband is done either by scanning the wristbands QR-code with the smartphone's camera, or by manually entering the wristband ID in a text field (screens 3 - 4). Adding a person to the company can be done in one of two ways. The first way is to manually enter the person's name (screen 6), and register their wristband through the same process described previously. The second option is to invite a person through their personal *Liseberg* account (screen 7). Additionally, users utilizing the first option has the opportunity to add information such as height and age of the people in their company. This allows the application to communicate ride requirements for attractions, and if people in the company fulfill them or not. Once the user has registered their company hence completed the process, they will be informed that the data is stored in the *Profile* tab, and taken back to the *Idag* tab.

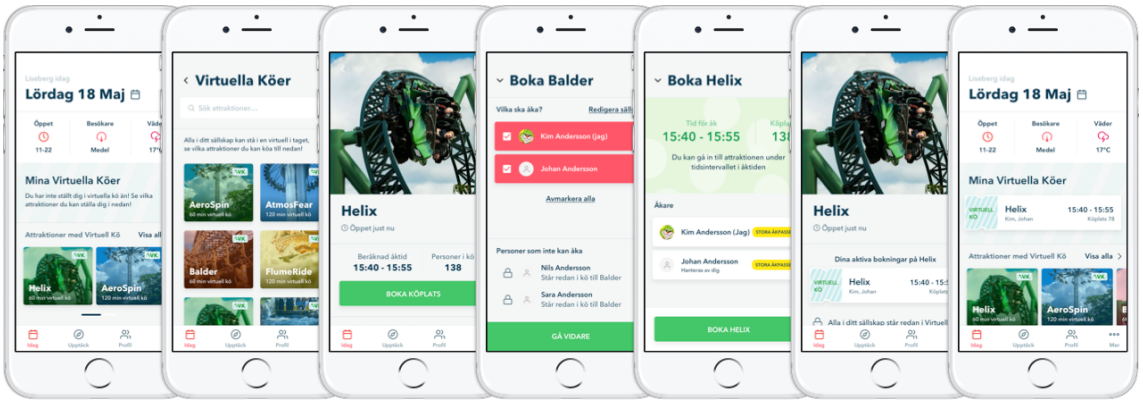


Figure 7.5: The flow of joining a virtual queue for *Helix*

Once back at the *Idag* page, the user is able to start the process of booking a spot in a virtual queue. This flow is displayed in figure 7.5 . The previous call to action button is replaced with an overview of some attractions with virtual queues (screen

1). The user can proceed by selecting *Visa alla* (show all) or one of the cards within the swim lane. Selecting *Visa alla* navigates to a new page where all attractions with virtual queues are displayed (screen 2). Selecting a card from the swim lane or the list of attractions brings the user to the attraction details page (screen 3). Here, users can browse images, read about the attraction or view its location. The page also features information about the attractions with virtual queues, and a call to action to join one of them. Tapping the call to action button starts the booking flow displayed on screen 4 and 5. First, users are able to select the people in the company who wants to ride the attraction (screen 4). The ones that do not fulfill the ride requirements cannot be selected for that specific ride. After selecting people, the user can continue to a confirmation page to accept their spot(s) (screen 5). Accepting their spot(s) sends the user back to the attraction details page, where an added card shows their newly booked spot(s) (screen 6). The same card is also visible on the *Idag* page (screen 7).

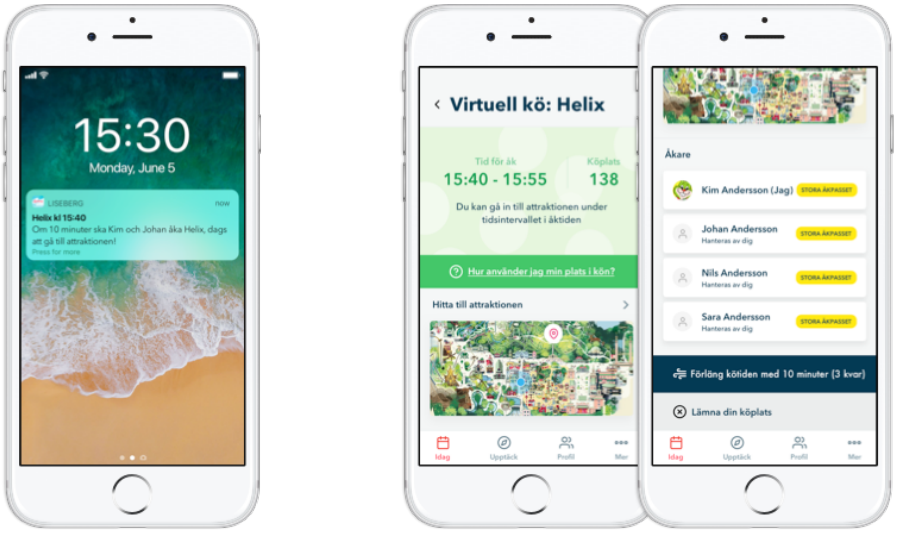


Figure 7.6: Push notification and booking details

Figure 7.6 visualizes how a user can access information and functionality for a booked virtual queue spot. Tapping a card reveals the booking details page (screen 2). The page can also be accessed by opening the push notification the user receives when their time to ride is closing in (screen 1). The booking details page provides information about the ride time, the user's current spot in the queue, the location of the attraction, and the selected riders. Users have the possibility to leave the queue completely or remove individual persons from the queue by tapping their names. The users can also prolong their queue time 10 minutes, a maximum of three times per attraction.

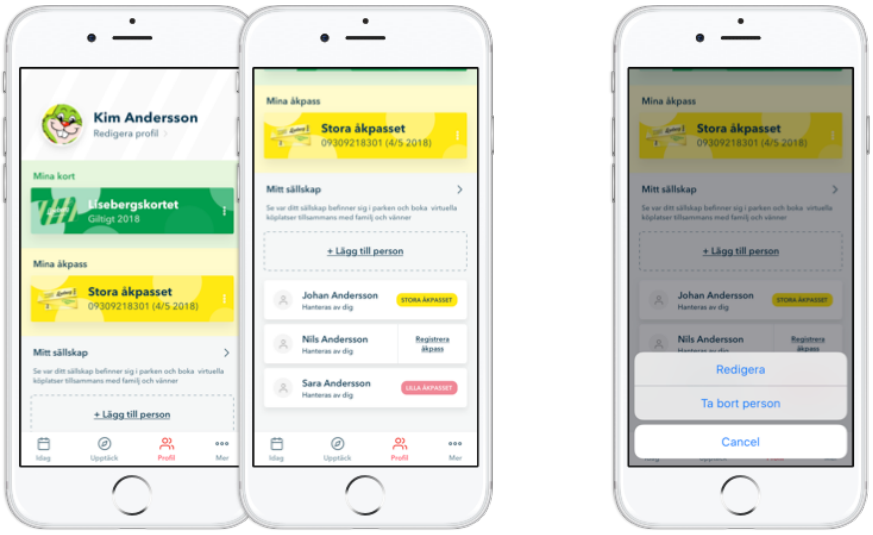


Figure 7.7: The profile tab

When the user navigates to the *Profile* tab, they will get information regarding their registered entry passes and ride admission wristbands (Figure 7.7, screen 1). The tab also offers the users the possibility to edit their personal profile manage their company (Figure 7.7, screens 2 - 3). Users can add new people, update the existing peoples' wristbands, edit their information or remove them. Adding a person is done in the same way as the onboarding flow (Figure 7.4).

Figure 7.8: Information displayed if an attraction breaks down

Attractions can break down for a number of reasons. This will affect the content of the application, as visible in figure 7.8. When a break down occurs for an attraction with a virtual queue, the application will display a push-notification for all affected users in the non-operational attractions virtual queue (screen 1). Opening the notification sends the user to the page with virtual queue booking details for that attraction (screen 2). They will receive information that they are able to keep

their existing spot in the queue, but their ride time will be post-phoned until later. From here, the user can either close their app and wait for a new ride-time or leave the queue altogether. If they leave, they will be presented with suggestions of other rides to book a spot for instead. If they stay in the queue, the application will display a new push-notification once the attraction is operational again, and the user is provided with a new ride-time. They are also able to discard the new time by leaving the queue. The attraction details page will also display break-related information (screen 3).

The application in the future
This application is also a foundation for further development regarding other problem areas identified throughout the project. Several of the concept ideas developed in the second iteration of the ideation 6.5.2 could be modified to fit this solution. As an example, the application can provide personalized suggestions about rides that are nearby or currently have a short line, in order to distribute people better across attractions. Additionally, it would be possible to add more information regarding current and estimated guest intensity, guiding the local market to choose when to visit *Liseberg*. This functionality could be combined with offers to attract more guests during pre-season, similar to the concept of *On demand riding* described in 6.5.2.

Brief description of other parts of the application
The mobile application is designed to include more functionality than is currently developed through this project, in line with *Liseberg's* current development and website functionality. The tab *Upptäck*, will include a collection of concerts, shows and other happenings in the park together with access to the attractions page. Also, the user will be able to find places to eat and access a map covering the area.

7.2 Recommendations

This section presents the second part of the results, which consists of recommendations regarding factors to consider when designing a virtual queuing concept.

One of the most important areas to consider when designing a virtual queuing solution is the complexity of the amusement park service. Amusement parks consist of multiple different components and processes, coexisting in intricate relationships. It has proven to be challenging to develop, evaluate and introduce new components to such systems, while still giving users a unified experience.

Another main area to account for are the guests' needs and motivations, particularly in relation to a virtual queuing service. At amusement parks, guests value spontaneity, social activities, and fun. In some cases, these sentiments contradict the intention and goal of a virtual queuing service. Finally, designers of a virtual queuing service need to keep in mind the broad set of potential users and user groups involved throughout research, evaluation, and implementation.

Detailed descriptions of mentioned areas and needs, together with further descriptions and recommendations are described below. The recommendations highlight the factors to consider when designing a virtual queuing service at an amusement park. The design process factors are based on challenges encountered by the authors when performing design activities throughout the project. The solution factors constitute a collection of the core insights from the results of the research and evaluation activities.

7.2.1 Recommendations regarding the process

This section provides recommendations of factors to consider when conducting a design process aimed to create a virtual queuing service at an amusement park. The recommendations are divided into the phases of the design process and can be found below.

Research

Explore and utilize information from multiple disciplines to understand the domain. The guests queuing experiences is a consequence of multiple independent and connected interactions with the amusement park service. This means that only researching literature and data related to design can be limiting. A designer should widen their field of view and explore interdisciplinary data and theories from management, marketing, psychology and other relevant areas, in order to understand how these areas interact to affect the queuing experience.

Limit the scope of the solution's area of intervention. The scope of an amusement park service is extensive and involves a large number of props, people, and processes. Furthermore, the users are often of all ages and spread out geographically. While the designer should try to form a general understanding of the complete amusement park service, they should limit the scope of the intended solution in order to focus their development and evaluation. This could be done by limiting a product to a specific part of the user journey, focusing on a particular user group or making a specific part of the operations more effective.

Research if virtual queuing is the most efficient way to improve the queuing experience. Due to the number of factors affecting the queuing experience, thoroughly research if virtual queuing is the most cost-efficient way to improve the queuing experience. Multiple smaller, targeted, interventions might be equally effective while easier to integrate into existing operations. For example, improving the communication of queue times and crowding can help guests plan their visits and manage expectations.

Account for the unique context of amusement parks when choosing methods and conducting research. It became evident throughout the project that the amusement

park environment pose challenges for research and evaluations. it is important for the designer to plan for a lively and intense atmosphere, common in amusement parks, in order to still acquire high quality on collected data. This includes the choice of methods, participants, and location for the collection of data.

Involve business stakeholders and people involved in the amusement park operations. In line with using a service design approach, it is important to consider all persons, directly or indirectly, involved in using or providing a service during research to understand limitations and opportunities in the operations. Furthermore, the service performance and experience for guests, employees and other stakeholders are dependent on each other. An experience improvement for one user group will have a positive impact on other user groups. A designer should identify these relationships and the consequences of changing the experience for one actor.

Account for the issues of differences in the memory of an experience and the actual experience. Due to the seasonal dependencies of the service, and time restrictions for conducting research throughout the project, there might be potential time gaps in the researched activities or behaviors and the actual happening of it. Designers facing this problem should account for the problem that participants memories of their experience might differ from their actual thoughts and actions at the park.

Evaluation

Account for difficulty evaluating a solution end-to-end at the park. As mentioned previously, the interaction and relationship between the parts of the amusement park service are complex. Consequently, evaluating a user's end-to-end interaction with a solution can prove difficult. It is unlikely that the designer can involve all props and processes of the service during the test, due to physical and operational limitations. Thus, a designer is only able to evaluate parts of the solution in isolation, making it harder to draw conclusions about the complete solutions efficiency in improving the queuing experience. Designers should be aware of this and try to use different methods targeting different parts of the experience in order to triangulate the data.

Evaluate the service in the right context for the specific task. Since different problems appear due to the given context, different testing settings will result in identification of different types of problems. Therefore, it is of importance to vary and make use of all relevant contextual settings that could be of value to the given evaluation.

Ensure to perform the evaluation methods with participants representing the intended user groups. Indirectly connected factors such as company size, traveling distance and season can have a large impact on guests experience of the evaluated system. The researchers should create a clear overview of what factors, characteristics and other user traits that could be of importance for the specific evaluation method. The intended evaluation group should be selected by considering the users targeted when limiting the solutions scope.

7.2.2 Recommendations regarding the solution

Amusement parks are experience-centric service, meaning that positive, personal and memorable experiences are at the core of the service offer. Because of this, improvements to the queueing experience should not only target efficiency of the queuing systems, but also explore opportunities for inducing pleasurable waiting experiences. This section aims to introduce the factors that are important to consider when designing a virtual queuing solution in order to improve the user experience of queuing at an amusement park. The findings are divided into categories presented below.

Introducing new services

Provide a strong value proposition. Some guests have resistance towards new technology or new unknown systems at amusement parks. The amusement park needs to introduce, motivate and guide the users in the benefits the virtual queuing service provides. Use as many communication channels as needed to make users aware of the service's existence and how to use it.

Lower the usage threshold to enable guests to adopt the service. Demanding users to download apps, purchase expensive tickets or introduce other forms of restrictions could make it harder to motivate guests to use the service. Lowering the barrier of entry increases the perceptions of the service being fair, as its accessible by as many guests as possible. Furthermore, a designer needs to consider which interaction possibilities the users should have with the virtual queueing service. A common theme in the research and evaluation was that guests perceive amusement parks as an environment were you disconnect yourself from smartphones and other digital products. Only having the service available through smartphones also introduces anxiety about battery life. It can be beneficial to explore non-digital touchpoints with a virtual queueing service in order to reduce the threshold. These could either be used in conjunction with or independently of the digital part of the service.

Fairness regarding time and money

The virtual queuing service needs to be perceived as fair. In order for the solution to be positively received, it needs to be perceived as fair by the amusement park guests. The implications of this are that the service existence needs to be clearly communicated, simple to gain access to and give all guests the same opportunities.

Create a valuable and helpful service without giving non-users a feeling of unfairness. Make sure that the guests using the virtual queuing service are not given such advantages that it appears or becomes unreasonably unfair for guests not using the service.

Increase the perceived value of the purchased entrance and tickets. Guests feel that one problem with long waiting times are the fact that they are usually not filled with activities, which reduce the feeling of getting value back. Many guests want to optimize their visit and experience as much as possible during their limited time.

Operational efficiency

Create the virtual queuing service in such way that it fits together with-, and supports existing, components of the amusement park. Explore ways to integrate existing props and processes at the amusement park in the virtual queueing service. Make sure different components of the service (both physical and digital) support each other and that any newly introduced part fits well into the established system, without disrupting any of the current systems. This will ultimately create synergy for the service at large and reduce adoption overhead for both users and business.

Maximise amount of guests utilizing their joined virtual queues. The service should help the user in order to arrive at the right ride at the right time, as well as motivate the guests to not miss their ride time. This is important in order for the service provider to be able to offer an optimal, efficient service, which in its turn will lead to a better experience for guests as the amount of waiting time is reduced.

Handle breakdowns. Rides and attractions are not unfailable. The virtual queuing service should enable the amusement park to communicate breakdowns that affect the guests' virtual queue spot and allow the guest to take appropriate action. Avoid inflicting situations where guests feel they have wasted their invested money and waiting time without gaining anything back.

Optimize the virtual queuing service to distribute guests and use the given space efficient. A virtual queuing system should utilize the given area and the provided activities in a way that minimize long lines and overcrowded areas, through distribution.

Physical dimensions

Keep the guests' physical comfort in mind. Guests find uncomfortable physical situations problematic. For example, inability to move freely and lack of seating possibilities. Guests utilizing the virtual queueing service will be moving freely around the park and should be able to find seating and places to rest.

Distribute guests to reduce crowing. Providing a virtual queuing solution will increase the number of people moving around the park. The amusement park should consider possibilities to distribute guests across physical locations in the park in order to reduce crowding problems at more popular areas.

Hedonic experience

Encourage users to make their freed up time meaningful or increase efficiency. Standing in a virtual queue frees up time for the user to do something else. Make sure the user is able to spend this time doing meaningful activities or increase their visit efficiency by riding additional attractions. The park needs to offer possibilities

that enable the users to do so.

Help guests balance planned and spontaneous activities. Guests find it important to be able to be spontaneous at amusement parks. By introducing a virtual queuing service, guests will be required to plan parts of their visit and take actions to account for their ride times. Virtual queuing solutions at amusement parks need to allow a certain degree of flexibility in order to handle unforeseen events such as delays. The guest should feel in control of their ability to use their spot in the attraction, while at the same time being supported by the service.

Make sure the virtual queuing service handles the social dimensions of amusement park visits. The main motivation for guests to visit amusement parks is to have a fun and social experience together with family and friends. Virtual queuing services need to support this by allowing guests to book, keep track of time and ride attractions together with others.

Communication

Guide the guest in the transition from digital to physical interaction with the service. Guide the user in terms of actions, timings, and location in the transition between digital queuing and interaction with the smartphone app, to physically enter the attraction. Make sure to use consistent information, tone, and graphics to create a unified experience that is easy to understand despite the change of communication channel.

Utilize multiple channels to communicate and interact with amusement park guests. Amusement parks offer multiple touch points with the guest, both digital and physical. Designers should strive to communicate newly introduced concepts and systems in a unified way across these established channels in a way that supports the guests.

Present the right information at the right time and support mental models. Right information prevents the guests from getting frustrated due to mismatches in expectations and reality. A designer should focus on understanding what information the guests need in different situations.

General

Utilize the guests' own motivations to avoid queues. Designers should benefit from the guests' own motivations, for example the motivation to avoid standing long times in lines, when developing solutions. The service should primarily be designed to help users achieve their wants and needs in the current situation, rather than introduce new alternatives.

8

Discussion

This chapter contains a discussion of the content of this thesis project. First, limitations of the process and its design activities are discussed. Then, the requirements and the prototype's relation to theory, their generalizability, and potential future work are presented.

8.1 Process

The following section discusses the thesis process in regards to the performed design activities. The activities are presented and discussed in the chronological order they were performed during the project.

During the project, the researchers utilized a number of valuable methods regarding research, evaluation, and visualization. However, the large amount of conducted methods resulted in some method's outcomes not being used to their full potential. Examples of this are the *Benchmarking* research, *User journey map* and *Service blueprint*. Even if the methods' direct effect on the project outcome is debatable, they were still beneficial as tools to collaboratively explore problems areas and valuable for communication between the project members. Decreasing the number of methods in favor for fewer methods with higher quality might have resulted in more valuable insights

It is important to note that the initial interviews (Section 6.2.1) were conducted during the winter season. Consequently, *Liseberg* was not open as usual. The gaming house was the only part of the park open, which does not feature any ride attractions or longer lines. Furthermore, the queuing is primarily a problem during peak season in the summer. This means that the participants were only partly in a realistic context, and rather than talking about a present-day experience, had to recall previous visits to *Liseberg*. Notwithstanding, since the participants had very strong opinions about queuing, they had no problem recollecting queuing-related experiences.

Also, the sample of interview subjects in the initial interviews can be discussed. The participants were recruited directly at *Liseberg* without previous contact. Therefore, the potential participant sample was limited by the people being at the specific location at the time of the research. Since the interviews were conducted during a local educational holiday, the participants were mainly local families from the Gothenburg area. Utilizing a more extensive sample of participants might have resulted in

additional information about pain-points and design opportunities for other types of guests.

It became obvious throughout the research that a large number of people had experiences and opinions about amusement parks in general, and *Liseberg* and queuing in particular. This insight could arguably call for conducting a survey early in the project. However, this idea was disregarded due to the access given to *Liseberg's* extensive statistics from field surveys. The data were assessed to be of relevant content, high quality and of good value to the project, hence the project group decided that no further quantitative research had to be conducted.

The project members used personas to create a shared understanding of the domain, users, and problems. However, it could be discussed that the personas were not utilized to their full potential. It is possible that using personas might have been more difficult within this specific project, due to *Liseberg's* wide range of guests. However, developing high-quality personas early in the project might have enabled more focused ideation and concept development phases. Furthermore, personas could have been used as a way to more extensively communicate user needs to stakeholder and others not completely involved in the project process. Finally, Cooper (2014) stresses the importance of personas in the *Goal-directed design* process. Developing the personas further might have allowed the requirements and framework process (6.7.2) adopted from *Goal-directed design* to be utilized more effectively.

Throughout the project, the business stakeholders have had a large influence on the project process. Especially in regards to creating, evaluating and selecting the final idea, *Virtual queuing*. An example of this was the result of the first ideation process, were a number of ideas were discarded due to negative feedback. It is worth discussing the consequence of this. From the beginning, the project aimed to develop a realistic solution where business, operational and economic concerns were kept in mind. The input from *Liseberg* management proved valuable in order to research and evaluate the feasibility of the ideas. It was regarded as positive that the business stakeholders were from different operational domains of *Liseberg*. This meant that they together had a thorough understanding of the park and could be used as expert evaluators in regards to previously mentioned concerns. However, as the involved business stakeholders are guided by *Liseberg's* existing needs, there is a possibility that novel solutions not considered by the business stakeholders were omitted due to their unexplored nature. It is likely that discarding the opinions of *Liseberg* management had resulted in a different solution being selected after concept evaluation. However, this might have resulted in a solution that was unable to fit into existing operations, thus failing the important aim of considering business and economic factors.

The research of employees at *Liseberg* used a method inspired by *UX Curve* (Section 4.3.6), but with some modifications created by the project members. The modified method asked the participants to first draw a timeline of a regular working day. The aim was to provide the researchers with a general understanding of the tasks

performed by entrance and ride attraction operators. This was valuable since the researchers were able to combine this activity with a semi-structured interview to understand how *Liseberg* operates from the employees perspective. After, the participants were asked to draw an emotional state curve, as the *UX curve* methodology introduces, in relation to the activities. By doing so, the participant's personal experience of their work in general, and the tasks in particular, were elicited. Since the researchers perceived this method to be helpful on several levels, it could be beneficial to use it when researching guests as well. However, the method was not used with guests in this project due to the large amount of time passed since their last visit.

After the research phase, two methods were used to synthesize data and insights to create a foundation for upcoming steps in the process. The first synthesizing method extracted the most essential focus areas and design opportunities, and summarized them into concrete themes, *Insight statements* and *"How might we"*-questions. This approach turned out to be valuable, as it enabled efficient brainstorming sessions and a representation of the research easy to communicate to business stakeholders. However, the project members realized that smaller details of the collected information became excluded since the themes primarily focused on broader topics. These details were regarded as valuable in order to evaluate the concepts generated from the brainstorming sessions. Thus, an additional, extensive, document of design principles was created by sifting through the research data again. Creating this document allowed for the *PUGH matrix* evaluation conducted later in the process. Separating the synthesis step into these two dimensions proved beneficial in order to focus the brainstorming on the bigger picture of the problem, while at the same time accounting for intricate details when evaluating the concepts.

The concept selected to develop further was *Virtual queuing*, even if it did not stand out as the top alternative in the *PUGH matrix*. Firstly, the differences in the results of the *PUGH matrix* were considered to be too small to base such a decision on. Secondly, the fact that the different concepts tackled very different problem areas made it reasonable to focus on the importance of each problem area itself, rather than the concept idea, in the decision of what to develop further. This was made by discussions with the business stakeholder *Liseberg*, as they were seen as experts in this field.

For the initial usability testing, it is important to note that the participant sample might not have been fully representative of the intended user groups. The participant sample became more narrow than planned due to several cancellations of booked tests. However, the tests still managed to elicit valuable insights around the usability of the prototype. Additionally, the tests were performed with a high fidelity prototype. The researchers were concerned that this would affect the types of identified problems. The hypothesis was that a low fidelity prototype would highlight other problem areas, regarding general navigation and structural issues, which would have been more important for the project at this time. However, the insights did primarily concern the hierarchy, information structure and overall conceptual

difficulties rather than interface details. Thus, the test was viewed as a success in this regard.

The user tests at *Liseberg* were conducted in a group setting in a busy environment, a setting representational of an actual *Liseberg* visit. However, this also introduced some consequences and problems with the tests. In some cases, the tests contents strayed away from the tasks performed by the participant operating the application, and instead resulted in general discussions about the application and service. Consequently, it was hard to observe and research the operator's interaction with the application. Furthermore, as some participants had brought smaller children along to the park, a substantial distraction during the tests were restless, impatient children. It is likely that this affected the parents' ability to focus on the tasks. In the test where an adolescent was involved, both the tasks and interview resulted in more extensive information. Changing the test environment, for example by using a more secluded location, might have resulted in additional elicited information.

The prototyping processes used in the project affected the tests ability to accurately test the service. The goals of the concept development phases were to create prototypes that realistically visualized the information and behavior of the *Virtual queuing* application. During the development of the prototypes, the designers had to account for several limitations in the prototyping tools, the scope of the prototype, and the time frame available to create them. Consequently, while the prototypes featured information, functionality and a look and feel close to a finalized application, there were flaws in the representation. First, the prototype featured multiple states needed to be visualized. Due to time restrictions, it was not possible to create all of them. This resulted in some participants receiving the wrong information because they made an unexpected action, not supported by the prototype. Secondly, it was not possible to create a prototype containing real data, such as current time or real waiting times. The consequence was a lack of immersion where some participants noticed and made remarks about inaccurate content. For example when the time to ride at an attraction had already passed when the test was performed. Lastly, failing to thoroughly represent some functionality complicated the tests. For example, some participants tried to reach the profile page using interface elements that were visible but not yet interactive, but would have worked in a finalized application.

The two different sets of user testing varied largely in form, participants, setting, and prototype design which could be seen as problematic. The two tests arguably failed in building on and utilizing each others' results due to the extensive re-design of the prototype before the second test. The amount of changed content made it difficult to draw conclusions about how specific changes affected the user experience. However, the tests were still valuable in terms of finding usability problems, evaluating the service itself, and identifying what did and did not work for the test participants.

The process of creating the recommendations relevant to the research question can be discussed. Due to the *Research through design* approach 4.1.2, the authors used their own experiences and knowledge of the process to elicit the recommendations. This

means that biases and predispositions by the authors can potentially be involved in the results. Although all recommendations are based on clear results and insights from the design activities, the choice of recommendations could have been affected by the authors' personal opinions.

8.2 Results

In this section, the main results of the project work, the recommendations and the developed prototype, are discussed individually and in relation to each other.

8.2.1 Recommendations

The choice to include process recommendations was based on the project members' perception of the process outcome. The initial intention was to solely focus on solution recommendations. However, as the project progressed, issues related to process execution in the amusement park domain appeared. Consequently, creating process recommendations was decided to be an important step, in order to support a design process that can create a service that follows the solution recommendations. It is important to note that the process recommendations are a result of the insights acquired from conducting this specific project. However, due to their broad description, they are likely beneficial in other design projects as well.

One negative aspect of the recommendations is the lack of internal prioritization. Although all recommendations can be valuable on their own, it is likely that some are more important than others in order to successfully design a virtual queuing service. Prioritizing the recommendations would make it easier for designers to understand the focal problems present when designing for amusement parks.

The recommendations concern the amusement park domain in general. They do not account for a one particular user group, time period or type of amusement park. There is a possibility that focusing the recommendations on a specific group of users might help a designer generate more feasible results.

Some of the solution recommendations were outside of the developed concept and prototype's scope, hence not accounted for in the final concept idea. For example, those recommendations concerned with introducing new services, physical dimension, and communication. Although all recommendations are based on research of guests and stakeholders, those outside of the concept's scope were not generated through an evaluation of the service. This means that their actual validity and importance should be analyzed and evaluated further. Especially in projects with a different scope or those intending to be developed and released.

The application of the recommendations will likely be affected by stakeholder's wants and needs. In this process, the choice to use the smartphone platform was primarily a result of business stakeholder feedback and their current development of a new

smartphone application. When applying the recommendations, external incentives such as partnership deals with other businesses or personal preferences might influence the ability to follow them.

8.2.2 The Liseberg Virtual queue service

In this section, the *Virtual queuing* service and the finalized smartphone application's design is discussed.

When selecting *Virtual queuing* as the concept area to develop further, the project was also delimited to focus on a smartphone application. This proved to have a set of consequences, as results from several design activities indicate that many guests are cautious about using phones at amusement parks. Some test subjects expressed a worry regarding that the service would require much attention. For example, if the guest were afraid of missing their riding time in a virtual queue, they may feel forced to continuously check their phones and keep track of time. This could increase the feeling of stress and prevent the feeling of flexibility, and make it harder to disconnect during their amusement park visit. On the contrary, you could argue that the service frees up time to spend on meaningful activities. Several actions were also taken in order to minimize these effects, such as adding notifications and the possibility to push forward the riding time.

Furthermore, participants rarely expressed that the smartphone platform itself was as a significantly positive part of the service. There is a possibility that the restriction of focusing on a smartphone application substantially limited the set of feasible solutions. It is possible that working with another platform, such as physical installations, might have been better received by the participants that found smartphones problematic, while at the same time not diminish the experience for others. Using a non-smart phone approach might also enable more people to use the service, possibly improving its perceived fairness. However, using another platform might have resulted in a product that could be more difficult to prototype and evaluate as the project members would have had to consider additional properties such as physical characteristics and placement.

Since the user experience is the complete interaction with a company, its services and products (Section 3.1), and the service have proven to be of high complexity, the developed prototype is difficult to evaluate in relation to the complete user experience. The components of user experience are described as the effects experienced due to both usability, usefulness and emotional impact factors (Section 3.1). Throughout this project, the developed concept has been tested and refined focusing on its usability factors, while several interviews also covered factors of usefulness. However, the emotional impact factors need to be evaluated and iterated further on. Finally, Section 3.1 also presents that the user experience is influenced by the branding and values of the service provider. This aspect was a recurring theme throughout research and evaluations of the service, as guests were concerned about its availability.

Liseberg's identity as an inclusive, open, amusement park created expectations that the service should be fair and accessible by everyone. This affected several design decisions and the end result.

The *Virtual queuing* service accounts for some of the pleasures proposed by Jordan (2005). One of the important parts of a visit to *Liseberg* is the pleasure of socializing with friends and family. Having the *Virtual queuing* service in place allows for more opportunities to spend meaningful time together with the people the guest are visiting with. If the guests feel that this extra time helps them improve their social relationships, the *Virtual queuing* service will likely be judged as socially pleasurable. Jordan (2005) suggest that pleasure is also achieved through an elimination, or absence, of pain. Consequently, the service can be judged as physically pleasurable, since it helps guests avoid discomforts associated with standing in line for longer periods of time. Finally, some of the props of the service were perceived as easy to use, thus accounting for psychological pleasure.

It can be argued that *Liseberg* is a *Experience-centric service*, focusing on creating emotional, memorable and personal connections through its engaging environment (Section 3.3). It is important to discuss whether the *Virtual queuing* service supports these goals or not. The core component of the concept, the smartphone application, did not prove to directly and in it self improve the customer's experience, develop any connections between the service provider and the user, or create an emotional bond to the product. However, the result and benefit of using the service, queuing to attractions virtually instead of physically, is aiming to fulfill this. Through the use of the application, the amusement park guests will free up time which could be utilized for the creation of more emotional and memorable experiences.

Perceived waiting time is an important factor that influences customer satisfaction with a service. *Virtual queuing* has the potential to reduce perceived waiting time by filling the waiting time with distractions (Section 3.4.1). However, it can be argued whether lowering perceived waiting time is an important benefit with the *Virtual queuing* service. The aim of the service is not to increase customer satisfaction by making the perceived waiting time as low as possible, but rather to make the actual waiting time pleasurable. The customer's satisfaction with *Liseberg* when using the *Virtual queuing* service, is likely not a result of the perceived waiting time being lowered, but rather that it enables them to engage in meaningful activities while waiting.

The developed *Virtual queuing* service is also interesting to discuss in relation to Norman's principles of waiting times (Section 3.4.1). In relation to the current system of *Express pass* at *Liseberg*, it is possible to argue that the newly developed solution covers or fulfills several of the principles to a larger extent. The *Virtual queuing* concept aims to eliminate confusion by providing additional feedback and explanation, regarding the virtual queue and other relevant information. The principle of keeping people occupied might be the one most affected, since the new solution allows the guest to fill their time with valuable activities, resulting in a feeling of

shorter waiting time. In the development of the new solution, it was also put much effort into creating a service experienced as fair, which is one of Norman's principles. It could be argued that the solution is improved in this sense, as it aims to be accessible to an extended amount of guests. However, the actual experience of the fairness of the service should be further evaluated in the context of an amusement park. The principle of having an appropriate waiting time is also touched upon, as the research showed that guests are more willing to wait longer times in a virtual queue than in a physical queue. However, this principle is hard to evaluate towards the current system, since that is built upon previously booked time slots and not includes the perception of waiting in a line. The other four principles of waiting time were not considered to have a significant importance or were not affected by the newly developed solution.

The *Virtual queuing* service can also be discussed in relation to previous research presented in Section 3.5. Niels (2017) suggests that the amusement park needs to use realistic data when allocating virtual queue spots to attractions. Fortunately, *Virtual queuing* is able to use information acquired from the previous *Express Pass* system to decide the number of spots available. Lemaster (2015) found that the adoption rates for virtual queuing systems were low in several amusement parks due to increased costs and lack of knowledge about the services' existence. These findings are aligned with the results of the research in this project. He also suggests that a lack of time flexibility was an issue in researched systems. The service presented in this project tries to solve this problem by introducing time slots and allowing guests to prolong their waiting time in the event of unexpected delays. If these improvements are substantial enough to alleviate the issue completely needs to be evaluated further.

Finally, *Virtual queuing* provides both benefits and disadvantages compared to the current *Express-Pass* system. *Express-Pass* enables better opportunity to distribute guests across seasons and weekdays. Days with high guest intensity will have fewer passes available, which can prompt potential guest to select other days with fewer guests and more *Express-Pass* slots. However, the *Virtual queuing* service was regarded as more flexible as it does not require the guest to plan their day of visit and time slots beforehand. Guests expressed that it can be problematic to book *Express-Passes* before going to the park, as the system does not adapt to changes in visiting time. *Virtual queuing* supports the guests' conceptual models to a higher degree as it provides clear information about when and where the user should utilize the virtual queue spots. In comparison, *Express-Pass* requires the guest to personally remember their booked attractions and time slots.

8.3 Generalizability

The list of recommendations and final design of virtual queuing service can be generalized, although with various limitations. The research and evaluations were conducted mainly on Swedish participants, living in the local area. This means that there are likely cultural differences affecting the efficiency of the recommendations

and virtual queuing service, were they to be used in other amusement parks. Furthermore, the virtual queuing service is developed in close relation to the existing operations at *Liseberg*. Other amusement parks likely have other processes in place, a different amount of people visiting, and additional physical limitations. It is important to acknowledge these differences when using the results of this thesis to develop a new virtual queuing service in another amusement park.

Virtual queuing services can be beneficial in other domains with queuing problems. However, using the requirements in other domains can prove problematic since they promote considerations of users' hedonic experiences. It is highly likely that the motivations and values of users present at amusement parks are different than those in other domains. Consequently, the recommendations should be used cautiously.

8.4 Future Work

Both parts of the results can be developed further in future studies. The requirements should be extended and improved by considering data from additional amusement parks, varying in location, guest count and size. The recommendations ability to guide the design of a virtual queuing service, and the efficiency with which they do so, should also be analyzed.

The service and its application should be researched and evaluated regarding its interaction and interplay with supporting processes and other communication channels. The application should be extended with additional functionality, taking these processes and channels into account. Using this approach would allow for a more holistic evaluation of the service, as the current project solely focused on evaluating the applications usability factors. Furthermore, future studies should research how virtual queuing services can be efficiently introduced at amusement parks. Specifically, how to inform guests about the service's existence and how to communicate its value proposition. The *Virtual queuing* service's impact over time and its effect on customer satisfaction in general, and queuing experience in particular, should also be evaluated. Finally, subsequent research and evaluations should consider the amusement park environment to a greater extent than in this project. The studies should strive to understand how noise and crowding affect the guest's interaction with the service.

Future studies should also evaluate how the choice of platform affects the guest experience. There are several ways to provide virtual queuing possibilities to guests. Physical installations and smartphone applications are only two alternatives. These alternatives, together with other platforms, should be evaluated towards user needs, budget, and physical allowance. The studies should also compare different platforms' perceived accessibility, fairness, and flexibility in order to understand how the choice of platform influences the guests' appreciation of the service. In addition, different platform alternatives should be reviewed and studied from an environmental perspective, looking at the effect of developing, producing and implementing all

components needed in order to provide a virtual queuing service.

In order for *Liseberg* to implement the *Virtual queuing* service, there are several steps that need to be considered. First, they need to make sure the concept is possible to integrate with the new smartphone application. A back-end system needs to be developed in order to manage the virtual queues. They need to establish the communication between this system, their website, the user accounts, and the smartphone application. Additional calculations on the quota of virtual queuing spots and regular line spots should be considered, taking the estimated application usage into account. Additionally, material and strategies for communication around the new system need to be developed and marketed to potential guests and employees. Further, it could be argued that a test release for a limited user group would be beneficial to identify eventual issues before a wide release.

9
Conclusion

The aim of this thesis was to explore queuing experiences at the amusement park *Liseberg*, and factors that should be accounted for in the development of a virtual queuing service. The research question that was developed and answered in the project was:

"What factors are important to consider when designing a virtual queuing service in order to improve the user experience of queuing at an amusement park?"

The research question has been investigated using multiple design activities in a design process. Overall, the process has followed the *Double diamond model*, but has also incorporated elements of *Goal-directed design*. Initially, the current state of the domain and previous research was explored with a *Literature review*, *Benchmarking* study and an examination of previously collected data from *Liseberg*. The needs, motivations and processes of *Liseberg's* guests, management and employees were then researched using *Interviews*. The results were modeled with *User journey maps* and a *Service blueprint*. Performing these activities resulted in insights into the limitations and opportunities related to improving the queuing experience at an amusement park. Backed by the insights, two brainstorming sessions were held and their results evaluated. *Virtual queuing*, a service where *Liseberg's* guests can stand in line without being physically present in a queue, was selected as the most promising concept. The project was also delimited to focus on a smartphone application. The concept was developed further through iterations of *Sketching* and *Prototyping*. In order to ensure that the service was in line with user needs, two user tests were conducted. One outside the amusement park context, where participants tested the prototype of the mobile application individually, and one at *Liseberg* where the prototype was tested in a group setting. Insights from the user tests were then incorporated in the final version of the service.

The process produced two types of results; a set of recommendations that highlight factors to consider when designing a virtual queuing service for amusement parks, and a prototype of a virtual queuing service to be available at *Liseberg*. The recommendations address both how to perform an effective design process in the domain, as well as elements critical to include in a compelling virtual queuing service.

This thesis contributes to the field of interaction design by presenting a process and two types of results that can be used as a foundation when developing a similar service in the future.

Bibliography

Ahmadi, R. H. (1997). Managing capacity and flow at theme parks. *Operations Research,* vol. 45, no. 1, pp. 1-13.

Barnes, B. (2010). Disney Tackles Major Theme Park Problem: Lines. *The New York Times.* `http://www.nytimes.com/2010/12/28/business/media/28disney.html?scp=1&sq=disney%20lines&st=cse` (15-02-2018).

Bohgard, M. et al. (2009). *Work and technology on human terms.* Stockholm: Prevent.

Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues,* vol. 8, no. 2, pp. 5-21.

Byström, H. (2015). *Helix.* `https://stickybeat.se/losningar/helix/` (06-02-2018).

Cambridge University Press. (2018a). *Cambridge Dictionary.* `https://dictionary.cambridge.org/dictionary/english/theme-park` (14-02-2018).

Cambridge University Press. (2018b). *Meaning of "queue" in the English Dictionary.* `https://dictionary.cambridge.org/dictionary/english/queue` (26-02-2018).

Chris, V., Roth, A.V., Chase, R.B. (2008). Experience, Service Operations Strategy, and Services as Destinations: Foundations and Exploratory Investigation. *Production and Operations Management,* vol. 17, no. 3, pp. 247-266.

Churchman, C.W. (1967). Wicked Problems. *Management Science,* vol. 14, no. 4, pp. B141-B142.

Cooper, A. et al. (2014). *About Face: The Essentials of Interaction Design,* 4th Edition. Indianapolis: John Wiley & Sons, Inc.

Davis, M.M., Heineke, J. (1994). Understanding the Roles of the Customer and the Operation for Better Queue Management. *International Journal of Operations & Production Management,* vol. 14, no. 5, pp. 21-34, `https://doi.org/10.1108/01443579410056777` (18-05-2018).

Davis, M.M., Heineke, J. (1998) How disconfirmation, perception and actual waiting times impact customer satisfaction. *International Journal of Service Industry Management,* vol. 9, no. 1, pp. 64-73.

Design Council and Technology Strategy Board. (2018). *Keeping Connected, Design Methods for Designing Services.* `https://www.designcouncil.org.uk/sites/default/files/asset/document/Design%20methods%20for%20developing%20services.pdf` (02-02-2018).

Design Council UK. (2018). *The Design Process: What is the Double Diamond?* `https://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond` (12-01-2018)

Desmet, P.M.A., Hekkert, P. (2002). Pleasure with Products, beyond usability. In *The basis of product emotions.* Eds. W. Green, P. Jordan, pp. 60-68. London: Taylor & Francis.

Desmet, P.M.A. (2003). A multilayered model of product emotions. *The Design Journal*, vol. 6, no. 2, pp. 4-13.

Disney. (n.d.). *FastPass+.* `https://disneyworld.disney.go.com/fastpass-plus/` (06-02-2018).

Fallman, D. (2008). Interaction Design Research in Human-Computer Interaction. *Design Issues,* vol. 24, no. 3, pp. 4-18.

Forlizzi, J. Koskinen, I., DiSalvo, C. et. al. (2011). Quality Control: A Panel on the Critique and Criticism of Design Research. *CHI '11 Extended Abstracts on Human Factors in Computing Systems, May 7–12, 2011, Vancouver, BC, Canada,* pp. 823-826.

Gail, T., Lucey, S. (1997). A Field Study Investigating the Effect of Waiting Time on Customer Satisfaction, *The Journal of Psychology,* vol. 6, no. 131, pp. 655-660.

Gaver, W. (2012). What Should We Expect from Research Through Design? *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '12, Austin, USA,* pp. 937–946.

Giacomin, J. (2014). What Is Human Centred Design? *The Design Journal*, vol, 17. no. 4, pp. 606-623.

Gibbons, S. (2017). Service Design 101. *Nielsen Norman Group.* `https://www.nngroup.com/articles/service-design-101/(14-02-2018)`

Google. (n.d). *Crazy 8's - Generate as many unique ideas as you can.* `https://designsprintkit.withgoogle.com/methods/sketch/crazy-8s/` (12-04-2018).

Hanington, B., Martin, B. (2012). *Universal methods of design: 100 ways to research complex problems, develop innovative ideas, and design effective solutions.* Rockport

Publishers.

Hartson, R., Pyla, P. (2016). *The UX book.* Amsterdam: Morgan Kaufmann.

Harley, A. (2015). Personas Make Users Memorable for Product Team Members. *Nielsen Norman Group.* https://www.nngroup.com/articles/persona/ (11-05-2018).

Heijden, H. (2004). User Acceptance of Hedonic Information Systems. *MIS Quarterly,* vol. 28, no. 4, pp. 695-704.

IDEO. (2015a). *Create Insight Statements.* In: *The Field Guide to Human-Centered Design.* IDEO.org. pp. 81-82.

IDEO. (2015b). *How Might We.* In: *The Field Guide to Human-Centered Design.* IDEO.org. pp. 85-86.

Interaction Design Foundation. (2018). *Service Blueprints - Communicating the Design of Services.* https://www.interaction-design.org/literature/article/service-blueprints-communicating-the-design-of-services (12-02-2018).

ISO International Organization for Standardization, *9241-210:2010*, https://www.iso.org/standard/52075.html (16-05-2018).

Jordan, P. W. (2005). *Designing Pleasurable Products - An Introduction to the New Human Factors.* London: Taylor & Francis.

Katz, K.L., Larson, B.M., Larson, R.C. (1991). Prescription for the Waiting-In-Line Blues: Entertain, Enlighten, and Engage.*Sloan Management Review,* vol. 32, no. 2, pp. 44.

Kelly, T., Littman, J. (2000). The art of innovation. *Lessons in Creativity from IDEO, America's Leading Design Firm,* pp. 53-66. https://courses.cs.washington.edu/courses/cse440/15wi/readings/Kelley_brainstorm.pdf (05-02-2018)

Kujala, S., et al. (2011). UX Curve: A method for evaluating long-term user experience. *Interacting with Computers,* vol. 23, no. 5, pp. 473-483.

Legoland UK. (2018). *Q-BOT.* https://www.legoland.co.uk/tickets-and-passes/parking-q-bot-and-extras/q-bot/ (15-02-2018).

Lemaster, G. A. (2015). *Analysis and implications of guest attitudes towards queuing in theme parks.*
http://etd.fcla.edu/CF/CFH0004744/Lemaster_Austin_G_201505_BS.pdf (16-5-2018).

Liseberg. (2017). *Det här är Liseberg.*
https://www.liseberg.se/om-liseberg/det-har-ar-liseberg/ (6-02-2018).

Liseberg. (2018a). *Express-Pass – bara på liseberg.se.* https://www.liseberg.se/handla/express-pass/ (06-02-2018).

Liseberg. (2018b). *Helix.* https://www.liseberg.se/attraktioner/helix/ (06-02-2018).

Lutz, H. (2007). *The impact of virtual queues for amusment parks.* http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.597.7664&rep=rep1&type=pdf
(16-05-2018).

Maguire, M. (2001). *Methods to support human-centred design.* http://www.cse.chalmers.se/research/group/idc/ituniv/courses/11/hcd/literatures/maguire%202001b%20UCD%20methods.pdf (18-05-2018)

Maister, D. (1984). The Psychology of Waiting Lines. In *The Service Encounter.* Eds. Czepiel, J., Solomon, M. R., Suprenant, C. D.C. Heath and Company Lexington Books, 1985.

Mongeau, P.A., Morr, M.C. (1999). Reconsidering brainstorming, *ABI/INFORM Global*, vol. 1, no. 1; pp. 14. http://www.csub.edu/~rdaniels/Mongeua%20and%20Morr%201999.pdf (05-02-2018).

Nessler, D. (2016). How to rethink the Design process, fail, reflect and iterate. *UX Collective.*
https://uxdesign.cc/how-to-fuck-up-the-design-thinking-process-and-make-it-right-d
(02-02-2018)

Niels, R. (2017). Universal discovers the challenges of a park-wide virtual queue system. *Theme Park Insider.* http://www.themeparkinsider.com/flume/201705/5588/ (15-02-2018).

Nielsen, J. (2000). Why You Only Need to Test with 5 Users, *Nielsen Norman Group*, https://www.nngroup.com/articles/why-you-only-need-to-test-with-5-users/
(28-04-2018).

Nielsen, J. (2012). Usability 101: Introduction to Usability, *Nielsen Norman Group*, https://www.nngroup.com/articles/usability-101-introduction-to-usability/
(28-04-2018).

Norman, D. (2004). *Emotional Design, Why we love (or hate) everyday things.* New York: Basic Books.

Norman, D. A. (2008). The Psychology of Waiting Lines. In *Clerks and Waiting Lines, in Sociable Design.* https://www.jnd.org/ms/Norman%20The%20Psychology%20of%20Waiting%20Lines.pdf (18-05-2018)

Norman, D., Nielsen, J. (2018). The Definition of User Experience (UX). *Nielsen*

Norman Group. https://www.nngroup.com/articles/definition-user-experience/ (18-05-2018).

Osborn, A. F. (1953). *Applied Imagination: Principles and Procedures of Creative Problem Solving.* New York: Charles Scribner's Sons.

Oxford Dictionaries. (2018). *Definition of queue in English.* https://en.oxforddictionaries.com/definition/queue (26-02-2018).

Pugh, S (1981). Concept selection: a method that works. eds. Hubka, V. *Review of design methodology. Proceedings international conference on engineering design, March 1981, Zürich.* pp. 497–506.

Pullman, M. E. and Gross, M.A. (2004). Ability of Experience Design Elements to Elicit Emotions and Loyalty Behaviors. *Decision Sciences,* vol. 35, no. 3, pp. 551-578.

Sharp, H., Rogers, Y., Preece, J. (2007). Data Gathering. In *Interaction Design: Beyond Human-Computer Interaction, Second Edition.* John Wiley & Sons. http://common.books24x7.com.proxy.lib.chalmers.se/toc.aspx?bookid=40936 (12-02-2018).

Shostack, L.G. (1982). How to Design a Service, *European Journal of Marketing,* vol. 16, no. 1, pp. 49-63, http://www.emeraldinsight.com.proxy.lib.chalmers.se/doi/pdfplus/10.1108/EUM0000000004799 (22-02-2018).

Spool, J. M. (2004). The KJ-Technique: *A Group Process for Establishing Priorities.* https://articles.uie.com/kj_technique/ (05-02-2018).

Stelmaszewska, H., Fields, B., Blandford, A. (2004). Conceptualising user hedonic experience. *Proceedings of ECCE-12, the 12th European Conference on Cognitive Ergonomics; 12-15 September 2004.* Eds. Reed. D.J., Baxter, G., Blythe, M. New York: 83-89.

Themed Entertainment Association and AECOM. (2013). *Theme Index and Museum Index: The Global Attractions Attendance Report.* https://www.aecom.com/content/wp-content/uploads/2015/10/2013_Theme_Index.pdf (17-05-2018).

Themed Entertainment Association and AECOM. (2014). *Theme Index and Museum Index: The Global Attractions Attendance Report.* https://www.aecom.com/content/wp-content/uploads/2015/10/2014_Theme_Index.pdf (17-05-2018).

Themed Entertainment Association and AECOM. (2015). *Theme Index and Museum Index: The Global Attractions Attendance Report.* https://www.aecom.com/content/wp-content/uploads/2016/05/2015_Theme_Index__Museum_Index.pdf (17-05-2018).

Themed Entertainment Association and AECOM. (2016). *Theme Index and Mu-*

seum Index: The Global Attractions Attendance Report. https://www.aecom.com/content/wp-content/uploads/2017/06/2016-ThemeMuseum-Index.pdf (17-05-2018).

The Techno Creatives. (n.d.). Liseberg Valkyria VR - A glimpse into the future. *The Techno Creatives.* http://technocreatives.com/projects/liseberg-a-glimpse-into-the-future (17-05-2018).

Vetenskapsrådet. (2002). *Forskningsetiska principer inom humanistisk-samhällsvetenskaplig forskning.* https://www.vr.se/inenglish/researchfunding/applyforgrants/conditionsforapplicationsandgrants/ethicalguidelines.4.5adac704126af4b4be280007769.html (18-05-2018).

Webster J., Watson, R.T. (2002). Analyzing the past to prepare for the future: writing a literature review. *MIS Quarterly,* vol. 2, no.26, pp. 13-23. http://www.jstor.org.proxy.lib.chalmers.se/stable/4132319?pq-origsite=summon&seq=1#page_scan_tab_contents (05-02-2018).

Wolfswinkel, J.F., Furtmueller, E., Wilderom, C.P. (2013). Using grounded theory as a method for rigorously reviewing literature. *European Journal of Information Systems,* vol. 22, no.1, pp. 45-55.

Zimmerman, J., Stolterman, E., Forlizzi, J. (2010). An Analysis and Critique of Research through Design: towards a formalization of a research approach. *Proceedings of the 8th ACM Conference on Designing Interactive Systems, August 16-20, 2010, Aarhus, Denmark,* pp. 310-319.

Zomerdijk, L.G., Voss, C.A. (2010). Service Design for Experience-Centric Services. *Journal of Service Research,* vol. 13, no. 1, pp. 67–82.

A

Visitor interview guide

Besökare

Mål: *Förstå om entréupplevelsen och köer är ett faktiskt problem och undersöka vilka positiva och negativa aspekter av dessa som förekommer.*

Introduktionsfrågor

- Ålder?
- Sysselsättning?

Frågor angående lisebergsbesök

- Har du varit på Liseberg under sommaren någon gång?
- Vad tyckte du var roligast?
    - Varför?
- Vad tyckte du minst om?
    - Varför?
- Planerade ni besöket?
- Hur brukar du vanligtvis köpa biljetter?
    - Vid Entré/Online?

Frågor angående köer

- Vad tycker du om köer på liseberg?
    - Förväntar du dig att det ska vara kö? Gör du aktiva val för att undvika köer? Om ja, vad?
- Vad tycker du om att stå i kö? (In till liseberg samt inne på liseberg)
- Vad är det värsta med att stå i kö? Vad är det bästa med att stå i kö?
- Vad brukar du göra när du står i kö, t.ex. till en åkattraktion?
    - Varför? Hur känns det?
- Vad går tidsgränsen för att du ska vilja vänta i en kö till en åkattraktion?
    - Vilka faktorer påverkar tidsgränsen? Typ av attraktion? Tid på dagen? Humör?
- Hur påverkar ditt ev. sällskap din köupplevelse?
    - Kompisar, Föräldrar, Småbarn?

B

Supporting visitor interview guide

Intervjuguide (personas)

Introduktionsfrågor

- Ålder?
- Sysselsättning? *(söker i första hand föräldrar som gått med sina barn eller ungdomar från göteborg)*
- Beskriv du själv med några korta meningar.
- Vad gillar du att göra på fritiden? Varför? *(hitta motivations)*
- Har du någon dator och telefon? Hur använder du dem? Ofta/Sällan? För skolarbete/jobb?

Frågor angående lisebergsbesök

- Har du varit på Liseberg under sommaren någon gång?
- Brukar du gå på Liseberg med någon? Vem? Varför dem?
- Vad har du för förväntningar på Liseberg?
- Vad tyckte du var roligast?
    - Varför?
- Vad tyckte du minst om?
    - Varför?
- Varför går du på Liseberg? Vad vill du få ut av ditt besök?
- Finns det någonting du blir frustrerad av under ett besök?
- Finns det någonting du blir positivt överraskad av under ett besök?

Frågor angående köer

- Vad tycker du om köer på liseberg?
    - Förväntar du dig att det ska vara kö? Gör du aktiva val för att undvika köer? Om ja, vad?
- Vad är det värsta med att stå i kö? Vad är det bästa med att stå i kö?
- Vad brukar du göra när du står i kö, t.ex. till en åkattraktion?
    - Varför? Hur känns det?
- Hur påverkar ditt ev. sällskap din köupplevelse?
    - Kompisar, Föräldrar, Småbarn?

C

Employee interview guide

Intro

Vi är jätteglada för att du vill vara med i vår intervju! Vi gör ett exjobb just nu, här på Techno Creatives, i samarbete med Liseberg. Tanken är att vi ska undersöker problem och potentiella lösningar kring kösystem! Vi har, och kommer, intervjua besökare men vi vill gärna intervjua dig för att också få en anställds perspektiv!

Introduktionsfrågor
Ålder, Yrke, Vad jobbade du med på Liseberg? När? Hur länge? Olika platser?

Tidslinje: Frågor kring arbetet på Liseberg
Vi vill förstå hur en arbetsdag ser ut - och tänkte att du ska få rita upp en tidslinje:
Från att du förbereder dig hemma tills att du kommer hem igen efter jobbet

Ta gärna din tid och beskriv de olika momenten - och skriv in dem på tidslinjen.

Stödfrågor vid behov:
- Hur förbereder du dig inför ett arbetspass?
    - Hur tar du dig till Liseberg?

Hur går det till när man startar ett arbetspass?
    - Vad är det första du gör, varför?

Vad är uppgifterna under arbetspasset?
Hur går det till när man avslutar ett arbetspass?
Vad för uppgifter ingår i öppnande/stängande?
Varför gör du det i den ordningen?
Vad händer mellan **x** och **y**?

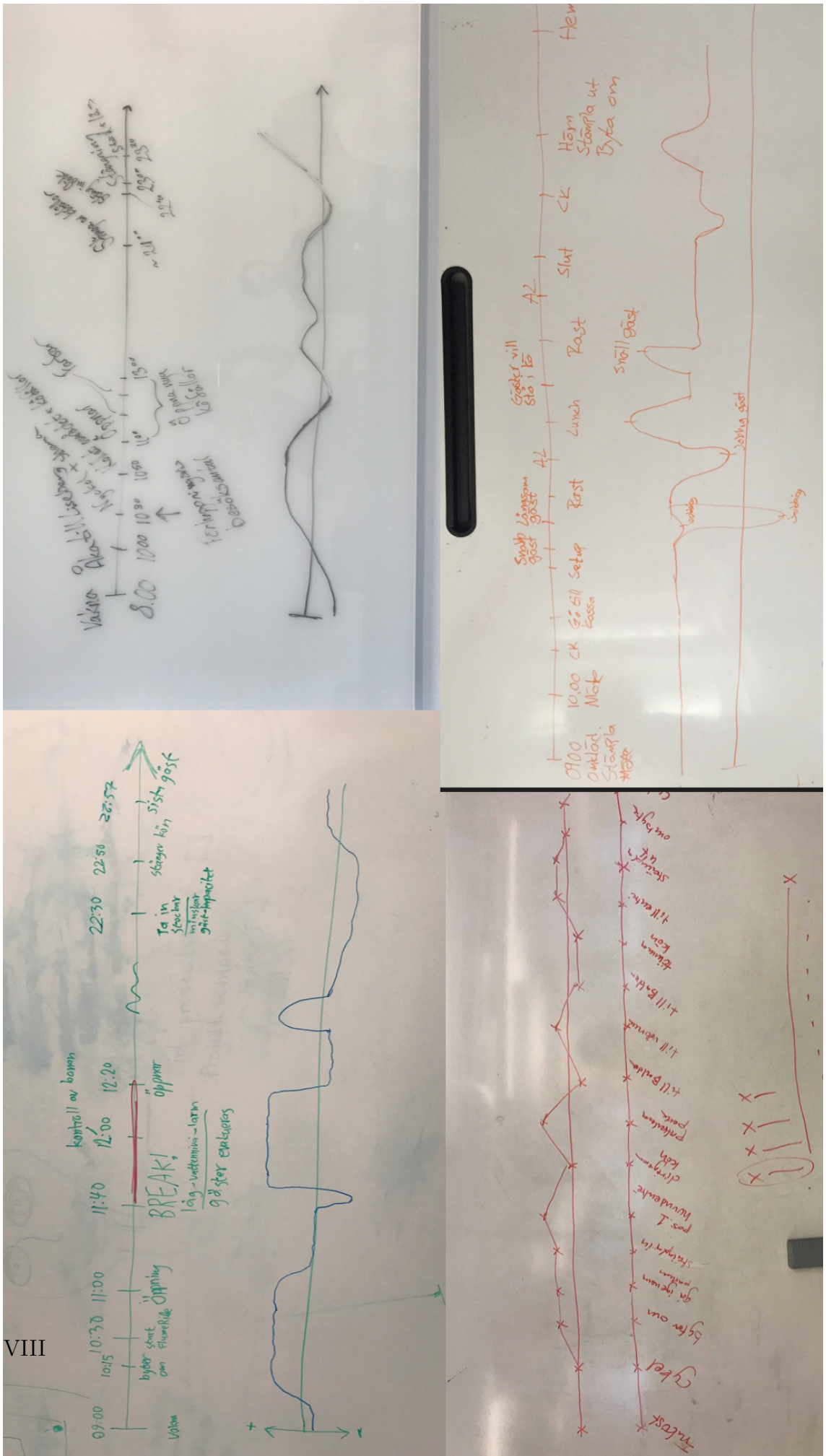
Känslomässig Upplevelse: Rita ut en kurva över hur du upplever de olika stegen - *Visa ett exempel*

Kommentera gärna på linjen vad det är som påverkar kurvan positivt eller negativt (se exempel om behövs)
- Vilken situation tycker du bäst om?
- Vilken situation tycker du minst om?

Stödfrågor:
- vad gjorde x mindre bra än y?
- Hur kände du i den situationen?
- Vad gjorde att kurvan gick upp/ner här?
- Hade du några förväntningar på x?
- Om du hade fått ändra på x, hur hade du gjort upplevelsen bättre?

D

Time lines and UX curves



E

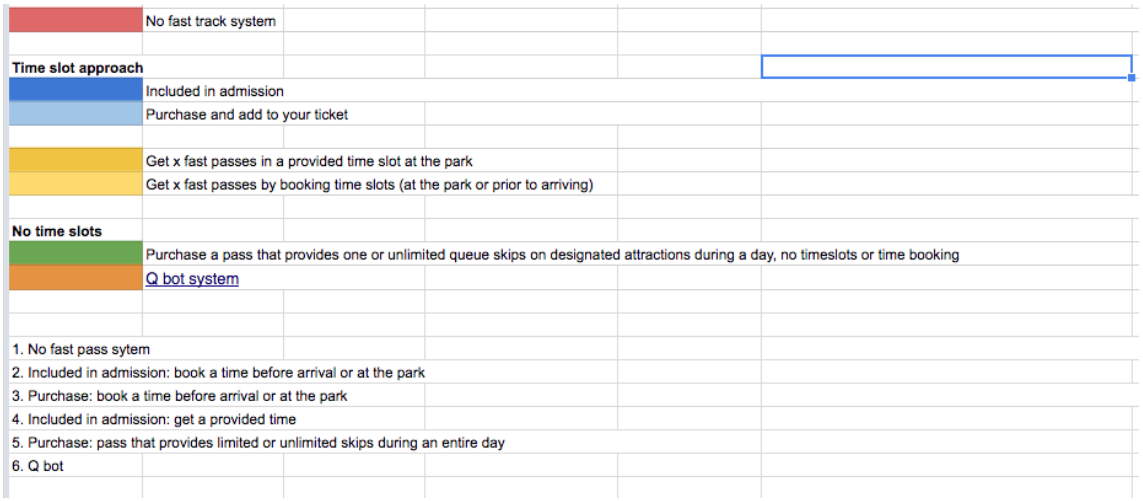
Benchmark

Largest amusement parks in the world						
Rank	Park	At	City, Country	Annual attendance (2016)	Fast pass system(s)	How to get acess to fast pass system
1	Magic Kingdom	*Walt Disney World Resort*	Florida, USA	20,395,000	FastPass+	Included in admission.
2	Disney Land Park	Disneyland Resort	California, USA	17,943,000	MaxPass (includes fastpass)	$10 fee. Book fastpasses through the maxpass app
3	Tokyo Disneyland	Tokyo Disney Resort	Urayasu, Chiba, Japan	16,540,000	FastPass	Use ordinary ticket on machines inside park (included in admission)
4	Universal Studios Japan		Osaka, Japan	14,500,000	Universal Express™ Pass	Buy for a pre set 4 or 7 top attraction rides (560kr ish)
5	Tokyo DisneySea	Tokyo Disney Resort	Urayasu, Chiba, Japan	13,460,000	FastPass	Use ordinary ticket on machines inside park
6	Epcot	Walt Disney World Re	Florida, United States	11,712,000	FastPass: Same as 3.	Use ordinary ticket on machines inside park (included in admission)
7	Disney's Animal Kingdom	Walt Disney World Resort	Florida, United States	10,844,000	FastPass: Same as 3.	Use ordinary ticket on machines inside park (included in admission)
8	Disney's Hollywood Studios	Walt Disney World Resort	Florida, United States	10,776,000	FastPass: Same as 3.	Use ordinary ticket on machines inside park (included in admission)
9	Universal Studios Florida	Universal Orlando Resort	Florida, United States	9,998,000	Universal Express™ Pass	Buy add on.
10	Universal's Islands of Adventure	Universal Orlando Resort	Florida, United States	9,362,000	Universal Express Unlimited or Universal Express Pass	Buy in a package ticket or add on to admission+ride tickets, add on is $29.99 - $99.99 per park per day (depending on day)
11	Disney California Adventure Park	Disneyland Resort	California, United States	9,295,000	FastPass+	Included in admission.
12	Chimelong Ocean Kingdom		Hengqin, China	8,474,000	-	-
13	Disneyland Park	Disneyland Paris	Marne La Vallée, France	8,400,000	Uses Fast Pass and Single Rider systems	
14	Lotte World		Seoul, South Korea	8,150,000	Magic Pass	Buy 1 or 5 attractions fast pass through app, throught machines around the park or online.
15	Universal Studios Hollywood		California, United States	8,086,000	Universal Studios Hollywood Express™	Buy online before, at machines inside park or at entrance.
16	Everland	Everland Resort	Yongin, South Korea	7,200,000	Q-pass	Buy 1 ticket per attraction, online or in park
17	Hong Kong Disneyland	Hong Kong Disneyland Resort	Lantau Island, Hong Kong	6,100,000	FastPass	Use ordinary ticket on machines inside park
18	Ocean Park Hong Kong		Aberdeen, Hong Kong	5,996,000	Ocean FasTrack	Online, entrance and inside the park
19	Nagashima Spa Land		Kuwana, Japan	5,850,000	Priority tickets	?
20	Europa-Park	Europa-Park Resort	Rust, Germany	5,600,000	No fast track system	-

Largest amusement parks in the				
Rank	**Park**	**System details**	**Tripadvisor/other comments on fast track system**	**Source:** Annual attendance on all: TEA/AECOM 2016 Global Attractions Attendance Report" (PDF). 1 June 2017. Retrieved 2 June 2017: http://www.teaconnect.org/images/files/TEA_235_103719_170601.pdf
1	Magic Kingdom	**FastPass+:** Book 1-3 timeslots (each day) that gives access to seperate queue, Use the MagicBand or card to enter the FastPass+ line any time during the 1-hour arrival window. After 3 FastPass+ uses, you can make another selection at an in-park kiosk or on your mobile device. Use that one, then get one more (based on availability).		
2	Disney Land Park	Use fastpass service through their app OR in-park pastpass distribution pints		
3	Tokyo Disneyland	You go to the FASTPASS ticketing machines near the entrance of the FASTPASS attraction you want to ride and hold your Passport ticket under the reader. Then return during the time period printed on the FASTPASS ticket . You either wait a prescribed period of time or use the Fastpass you are already holding before you can get another. scan the QR code on your printed e-ticket to receive a Fast Pass with a designated time period printed on it.	"Also, can someone teach me how tp get a fastpass to different rides? It is pretty embarrassing that despite going to Disney for 3 times but till now I still have no idea where to get the fastpass" Singaporian, 30 April 2011	http://www.tokyodisneyresort.jp/en/help/tdl_fastpass.html
4	Universal Studios Japan	Tickets can be purchased on the day at the park, but are available only while supplies last. Tickets will not be available on the day if they are sold out beforehand (excluding some tickets)		https://www.usj.co.jp/e/ticket/express_pass.html
5	Tokyo DisneySea	Works as Tokyo Disneyland. You can only get 1 Fast Pass every 2 hours		https://thetravelintern.com/ultimate-tokyo-disneyland-and-disneysea-guide/
6	Epcot	If you are staying at a Disney Resort hotel, you can make your FastPass+ selections up to 60 days prior to check-in		https://disneyworld.disney.go.com/en_GB/faq/fast-pass-plus/product-description/
7	Disney's Animal Kingdom			https://touringplans.com/animal-kingdom/fastpass
8	Disney's Hollywood Studios	Hollywood Studios has a tiered FastPass+ system, meaning that the park restricts the number of FastPass+ reservations guests can make for its headliner attractions. Of the three FastPass+ selections that can be made in advance for each day, a maximum of ONE can be for an attraction in Group A (most popular)		https://touringplans.com/hollywood-studios/fastpass
9	Universal Studios Florida	FREE Universal Express Unlimited™ ride access is included for guests of select Universal Orlando Resort™ on-site hotels.		https://www.universalorlando.com/web/en/us/tickets-packages/express-passes/index.html
10	Universal's Islands of Adventure	Unlimited: Valid for unlimited use at each participating attraction.	Single Rider Lines are often even faster than Universal Express pass lines.	https://www.undercovertourist.com/blog/universal-express-pass/
11	Disney California Adventure Park	When inside: Insert their ticket into the barcode reader of an attraction. If you have a current: you cant get one more. You receive a ticket with a timeslot.		https://touringplans.com/disney-california-adventure/fastpass
12	Chimelong Ocean Kingdom	-		
13	Disneyland Park			
14	Lotte World	Fast pass at extra cost 100.000 krw (all day pass) or 30.000 krw 5 attraction,		http://blog.funtastickorea.com/everything-need-know-lotte-world/
15	Universal Studios Hol	One time quick acess to each ride. plus priority seating on shows.		https://www.undercovertourist.com/blog/universal-studios-hollywood-front-line-pass/
16	Everland	Q-pass is a one-time fast track ticket for a selected attraction. Attractions have a special Q-pass queue that bypass the ordinary queue.		http://everland.eticket.placem.co.kr/everland/page/faq_en.html
17	Hong Kong Disneyland	FASTPASS is available on selected rides. Look at the return time visible on a sign, if it works for you, scan your park admission ticket in the FASTPASS machine. The machine generates a ticket with a return time, during which you can access the FASTPASS entrance by showing a cast member the ticket.		https://www.hongkongdisneyland.com/guest-services/fastpass/
18	Ocean Park Hong Ko	Provides priority access to designatde rides, once per attraction. Available in a (7) and (all) version, where (7) restricts the visitor to 7 rides, and (all) gives unlimited rides. The FasTrack is valid for the entire day of the purchase.	The limitations in designated rides makes it less valuable	https://www.oceanpark.com.hk/en/park-information/news/new-ocean-fastrack-less-queues-more-fun
19	Nagashima Spa Land	-	-	-
20	Europa-Park	-		

Other parks to include in benchmark						
45	Six Flags Great America		Illinois, United States	2,950,000	Uses Q-bot system	
43	Hersheypark		Pennsylvania, United States	3,276,000	Fast Track Pass	Purchase online or at the park. Available in normal and unlimited versions.
35	PortAventura Park	PortAventura World	Salou and Vila-seca, Spain	3,650,000	Express Pass	Purchase in the park. Available online when booking hotels. Avaliable in multiple versions.
25	Tivoli Gardens		Copenhagen, Denmark	4,640,000	No fast track system	
24	Efteling		Kaatsheuvel, Netherlands	4,764,000	No fast track system	
Europe: 8	Gardaland	Gardaland Resort	Castelnuovo del Garda, Italy	2,880,000	Express Pass: MY TOP 10, Express Pass Explorer, Express Pass Adrenaline	
Europe: 9	Puy du Fou		Les Epesses, France	2,220,000	-	
Europe: 10	Legoland Windsor		Windsor, United Kingdom	2,183,000	Uses Q-bot system	Same as below, £20-80
Europe: 11	Legoland Billund	Legoland Billund Res	Billund, Denmark	2,091,000	Uses Q-bot system	Q-boten hyras ut från försäljningsstället innanför huvudingången (179-649 DKK)
Europe: 12	Phantasialand		Brühl, Germany	1,995,000	Quick Pass	Buy special package with this
Europe: 13	Alton Towers	Alton Towers Resort	Alton, United Kingdom	1,980,000	Fasttrack for skipping queues, digipass to get photos	Buy online or at entrance with aditional cost (£20-55)
Sweden: 2	Gröna Lund		Stockholm, Sweden	1,510,000	None	-
Latin America: 1	Six Flags México		Mexico City, Mexico	2,486,000	Flash Pass, Flash Pass Platinum	Buy at extra cost while in the park
Latin America: 2	Beto Carrero World		Santa Catarina, Brazil	2,080,000	Fast Pass	Buy add on to ordinary ticket&entrance, online or upon arrival
Latin America: 3	La Feria Chapultepec	Mágico	Mexico City, Mexico	1,591,000	None	
Latin America: 4	Hopi Hari		São Paulo, Brazi	1,468,000	VIP Pass	Buy before or on arrival, as add on to ordinary ticket. you get paper ticket
Sweden: 1	Liseberg		Göteborg, Sweden	3,000,000	Express Pass	Get acess to 3 if book online - choose timeslot for each ride while booking.
	No fast track system					
Time slot approach						
	Included in admission					
	Purchase and add to your ticket					
	Get x fast passes in a provided time slot at the park					
	Get x fast passes by booking time slots (at the park or prior to arriving)					
No time slots						
	Purchase a pass that provides one or unlimited queue skips on designated attractions during a day, no timeslots or time booking					
	Q bot system					
1. No fast pass sytem						
2. Included in admission: book a time before arrival or at the park						
3. Purchase: book a time before arrival or at the park						
4. Included in admission: get a provided time						
5. Purchase: pass that provides limited or unlimited skips during an entire day						
6. Q bot						

	Park	System details	Tripadvisor/other comments on fast track system	Source:		
arks to include in benchm						
45	Six Flags Great Amer			https://www.wikihow.com/Use-a-Flash-Pass-at-Six-Flags		
43	Hersheypark	Book a day for the fast track pass to be valid, limited passes available. Normal: skip the line one time per day on each participating ride. Unlimited: Skip the line unlimited times per day on participating rides. Less than 20 min wait		http://www.hersheypark.com/rides/fast-track-pass.php		
35	PortAventura Park	Each express pass is valid one day. Proivdes access to fast access entry on designated attractions one time (max) or unlimited times (premium). To ride the front row, a maxgold or premiumgold pass is required		https://www.portaventuraworld.com/en/tickets/express-pass https://www.portaventuraworld.com/en/preguntas-frecuentes/pase-express		
25	Tivoli Gardens					
24	Efteling					
	Gardaland	Express Pass: MY TOP 10: Entry to use fast-line for 10 attractions of your choice, 1 time each (in total 40). Electronic wristband. Express Pass: Explorer: Entry to use fast-line to 8 (calm) pre determined attractions, 1 time each. Express Pass : Adrenaline: Entry to use fast-line to 8 (top attractions) pre determined attractions, 1 time each.				
	Puy du Fou					
0	Legoland Windsor	Same as below				
1	Legoland Billund	Med en Q-bot har ni möjlighet att boka tid till vissa attraktioner och slipper på så vis stå i kö vid attraktionen. Ni kan fritt utnyttja parkens alla andra attraktioner, butiker och matställen medan ni väntar på att det blir er tur. Ni kan välja mellan tre olika prisgrupper: Silver, Gold eller Platinum. Vid köp av en Silver Q-bot har ni samma väntetid som alla andra, men slipper vänta vid attraktionen och kan istället utnyttja parkens övriga attraktioner. Väljer ni en Gold Q-bot är er väntetid ungefär hälften av attraktionens befintliga väntetid. Och väljer ni en Platinum Q-bot kan ni nästan gå direkt till era favoritattraktioner utan att vänta och ni kan boka flera gånger		https://www.legoland.dk/sv/planera-besok/boka-med-q-bot/		
2	Phantasialand	max 4 people / pass,				
3	Alton Towers	Acces one time per attraction: Bronze (4 set attractions), Silver (6 set attractions) Gold (15 set attractions) when you purchase your ticket you will be asked to select a time slot to ride within.		https://www.altontowers.com/theme-park/extras/fastrack/, https://towersstreet.com/theme-park/fastrack/		
2	Gröna Lund	-				
rica: 1	Six Flags México	Each pass THE FLASH Pass contains 3 accesses and you can use them as follows: 1 person in 3 different rides, 1 person 3 times in the same rides . Platinum: same but with 10.		https://www.sixflags.com.mx/es/mexico/store/flash-pass		
rica: 2	Beto Carrero World	The Fast Pass is an individual and non-transferable bracelet, which entitles 16 special accesses to eight Beto Carrero World attractions (2 per pass)	Another tip: the ticket price for two days is cheaper than 1 day + fast pass. It is worth more.	https://www.tripadvisor.com.br/ShowTopic-g2620832-i28219-k10345196-Fast_pass_no_Beto_Carrero-Beto_Carrero_World_State_of_Santa_Catarina.html		
rica: 3	La Feria Chapultepec			-		
rica: 4	Hopi Hari	Skip queue 1 time per attraction. They manuallt checks your pass once you used it for an attraction.		http://www.hopiharimania.com/2014/08/vip-pass-fura-fila-hora-do-horror-2014.html		
1	Liseberg	Show e-ticket or printed ticket in fast line, keep track of your time yourself.				



	No fast track system
Time slot approach	
	Included in admission
	Purchase and add to your ticket
	Get x fast passes in a provided time slot at the park
	Get x fast passes by booking time slots (at the park or prior to arriving)
No time slots	
	Purchase a pass that provides one or unlimited queue skips on designated attractions during a day, no timeslots or time booking
	Q bot system
1. No fast pass sytem	
2. Included in admission: book a time before arrival or at the park	
3. Purchase: book a time before arrival or at the park	
4. Included in admission: get a provided time	
5. Purchase: pass that provides limited or unlimited skips during an entire day	
6. Q bot	

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Statistics from Liseberg

Insights from stats

The difference in numbers is bigger between peak season and pre-season than between peak season and post-season.

The average visit at Liseberg is 1.5h longer (*6h 47min*) during peak season than during pre-season (*5h 14min*). ~60% of visit during peak seasons is longer than 6 hours, while visit of the same length is only 35% of the visits during pre-seasons.

Families are the biggest group of guests, constituting ~70% of the total amount of visitors during summer.

The guests are primarily from Sweden (~95%), but the number of Norwegian guests increase during peak season.

78,27% of pre-season guests, and 56,12% of peak seasons guests, are living close to Gothenburg (within 200km).

Peak season 2017 **(Ta reda på när detta är)**
Average company size 4.59 people.
Average visit time is 6h 47 min
77,38% of visitors are in company with their family
17,2% are in company with friend(s)
32,49% of visitors are local market (lives within 0-40 km distance)
23,63% of visitors are daytrip market (lives within 50-190 km distance)
15,74 % of visitors lives 200-290 km distance
28,14 % of visitors are distance market (300 km +)

Pre season 2017 **(Ta reda på när detta är)**
Average company size 4.66 people.
Average visit time is 5h 15 min
67,48% of visitors are in company with their family
18,07% are in company with friend(s)
57,30% of visitors are local market (lives within 0-40 km distance)
20,97% of visitors are daytrip market (lives within 50-190 km distance)
9,20% of visitors lives 200-290 km distance
12,53 % of visitors are distance market (300 km +)

Peak Season 2017 (högsäsong) compared with Pre Season 2017 (försäsong)

Demografi

Period: Säsong | Säsong: Högsäsong 2017 | Jmf: Försäsong 2017

Antal svar: 3610 (Antal besökare: 1110510)

Antal svar Jmf: 4131 (Antal besökare Jmf: 621436)

Frekvensrapport

HUR LÄNGE STANNADE DU PÅ LISEBERG?	%	Jmf	+/-
0-1 tim	0,00	0,13	-0,13
1-2 tim	0,94	3,19	-2,25
2-3 tim	5,77	11,78	-6,02
3-4 tim	8,82	18,86	-10,04
4-5 tim	10,56	15,72	-5,16
5-6 tim	12,02	12,66	-0,64
6-7 tim	12,60	10,70	1,90
7-8 tim	12,46	8,74	3,73
8-9 tim	10,02	6,73	3,29
9-10 tim	26,81	11,48	15,32
Summa:	**100%**	**100%**	
Genomsnittlig besökstid	**6h 47min**	**5h 14min**	
ÄR DU HÄR I SÄLLSKAP MED NÅGON? (MULTISVAR)	**%**	**Jmf**	**+/-**
Ensam	1,60	2,49	-0,89
Familj	77,38	67,48	9,90
Gruppresa	2,16	4,99	-2,83
Jobbet	1,09	3,35	-2,27
Kompis	17,20	18,07	-0,87
Med respektive	9,60	12,07	-2,46
HUR GAMMAL ÄR DU OCH DE I DITT SÄLLSKAP?	**%**	**Jmf**	**+/-**
0-6 år	14,41	14,20	0,20
7-9 år	9,12	7,99	1,13
10-12 år	9,72	8,92	0,80
13-15 år	8,13	7,01	1,12
16-17 år	4,70	4,89	-0,19
18-19 år	3,38	2,83	0,55
20-24 år	4,69	4,17	0,52
25-29 år	5,58	6,67	-1,09
30-34 år	7,91	8,25	-0,33
35-39 år	8,56	8,53	0,02
40-44 år	9,19	8,99	0,20
45-49 år	5,80	5,43	0,37
50-54 år	3,50	4,55	-1,05
55-59 år	1,72	2,73	-1,01
60-64 år	1,58	2,52	-0,93
65+ år	2,01	2,32	-0,31
Summa:	**100%**	**100%**	
Genomsnittligt sällskap	**4.59 personer**	**4.66 personer**	
ÄR DU MAN ELLER KVINNA?	**%**	**Jmf**	**+/-**
Man	38,32	37,20	1,12
Kvinna	61,51	62,42	-0,91
Annat	0,17	0,38	-0,21
Summa:	**100%**	**100%**	
RESSÄTT? (MULTISVAR)	**%**	**Jmf**	**+/-**
Bil	67,22	53,24	13,98
Kollektivtrafik (buss/spårvagn)	24,23	35,33	-11,10
Gång	5,24	8,33	-3,09
Cykel	1,19	2,72	-1,52
Tåg	8,78	6,81	1,97
Flyg	0,72	0,59	0,13
Annat	1,02	1,73	-0,71

Geografisk rapport

FRÅN VILKET LAND KOMMER DU?	%	Jmf	+/-
Sverige	92,58	97,18	-4,60
Norge	6,05	1,92	4,12
Danmark	0,52	0,10	0,42
Övriga utlandet	0,85	0,80	0,06
Summa:	**100%**	**100%**	
LÄN?	**%**	**Jmf**	**+/-**
Stockholm	7,24	2,99	4,24
Uppsala	1,53	0,68	0,85
Södermanland	1,14	0,48	0,66
Östergötland	3,42	1,97	1,45
Jönköping	4,00	3,38	0,62
Kronoberg	1,68	0,87	0,81
Kalmar	1,45	1,27	0,18
Gotland	0,02	0,02	0,00
Blekinge	1,71	0,41	1,30
Skåne	6,93	4,77	2,17
Halland	5,56	5,73	-0,17
Västra Götaland	46,47	68,51	-22,04
Värmland	2,45	1,23	1,22
Örebro	2,23	1,11	1,13
Västmanland	1,09	0,49	0,60
Dalarna	1,23	0,39	0,84
Gävleborg	0,72	0,08	0,64
Västernorrland	0,30	0,29	0,01
Jämtland	0,50	0,18	0,32
Västerbotten	0,62	0,18	0,44
Norrbotten	0,55	0,19	0,36
Ospec	9,17	4,80	4,37
Summa:	**100.01%**	**100.02%**	
RESVÄG?	**%**	**Jmf**	**+/-**
Lokalmarknad (0-4 mil)	32,49	57,30	-24,81
Dagsresemarknad (5-19 mil)	23,63	20,97	2,66
20-30-milscirkeln (20-29 mil)	15,74	9,20	6,54
Distansresemarknad (30+ mil)	28,14	12,53	15,62
Summa:	**100%**	**100%**	
VILKEN DEL AV NORGE?	**%**	**Jmf**	**+/-**
Nordnorge, Trøndelag	5,27	4,66	0,61
Östlandet	76,53	84,69	-8,16
Sörlandet	10,16	7,29	2,86
Västerlandet	8,05	3,35	4,69
Summa:	**100%**	**100%**	

Peak Season 2017 (högsäsong) compared with Post Season 2017 (eftersäsong)

Demografi

Period: Säsong | Säsong: Högsäsong 2017 | Jmf: Eftersäsong 2017

Antal svar: 3610 (Antal besökare: 1110510)

Antal svar Jmf: 2013 (Antal besökare Jmf: 395662)

Frekvensrapport

HUR LÄNGE STANNADE DU PÅ LISEBERG?	%	Jmf	+/-
0-1 tim	0,00	0,22	-0,22
1-2 tim	0,94	1,90	-0,95
2-3 tim	5,77	7,03	-1,26
3-4 tim	8,82	10,20	-1,38
4-5 tim	10,56	12,21	-1,65
5-6 tim	12,02	13,77	-1,75
6-7 tim	12,60	14,40	-1,80
7-8 tim	12,46	12,66	-0,20
8-9 tim	10,02	11,04	-1,02
9-10 tim	26,81	16,57	10,23
Summa:	**100%**	**100%**	
Genomsnittlig besökstid	**6h 47min**	**6h 5min**	
ÄR DU HÄR I SÄLLSKAP MED NÅGON? (MULTISVAR)	**%**	**Jmf**	**+/-**
Ensam	1,60	1,21	0,38
Familj	77,38	82,02	-4,64
Gruppresa	2,16	1,55	0,61
Jobbet	1,09	1,78	-0,69
Kompis	17,20	14,69	2,51
Med respektive	9,60	8,78	0,83
HUR GAMMAL ÄR DU OCH DE I DITT SÄLLSKAP?	**%**	**Jmf**	**+/-**
0-6 år	14,41	17,03	-2,62
7-9 år	9,12	10,78	-1,66
10-12 år	9,72	10,03	-0,31
13-15 år	8,13	5,70	2,43
16-17 år	4,70	2,49	2,21
18-19 år	3,38	1,82	1,57
20-24 år	4,69	3,40	1,29
25-29 år	5,58	5,55	0,02
30-34 år	7,91	7,59	0,32
35-39 år	8,56	10,41	-1,85
40-44 år	9,19	9,71	-0,52
45-49 år	5,80	5,94	-0,14
50-54 år	3,50	3,13	0,37
55-59 år	1,72	1,86	-0,15
60-64 år	1,58	1,65	-0,07
65+ år	2,01	2,91	-0,90
Summa:	**100%**	**100%**	
Genomsnittligt sällskap	**4.59 personer**	**4.62 personer**	
ÄR DU MAN ELLER KVINNA?	**%**	**Jmf**	**+/-**
Man	38,32	36,83	1,48
Kvinna	61,51	62,79	-1,28
Annat	0,17	0,38	-0,20
Summa:	**100%**	**100%**	
RESSÄTT? (MULTISVAR)	**%**	**Jmf**	**+/-**
Bil	67,22	64,59	2,63
Kollektivtrafik (buss/spårvagn)	24,23	26,77	-2,53
Gång	5,24	6,11	-0,87
Cykel	1,19	1,79	-0,60
Tåg	8,78	7,61	1,17
Flyg	0,72	0,50	0,22
Annat	1,02	1,13	-0,11

Geografisk rapport

FRÅN VILKET LAND KOMMER DU?	%	Jmf	+/-
Sverige	92,58	97,18	-4,60
Norge	6,05	1,54	4,51
Danmark	0,52	0,15	0,37
Övriga utlandet	0,85	1,13	-0,28
Summa:	**100%**	**100%**	
LÄN?	**%**	**Jmf**	**+/-**
Stockholm	7,24	2,50	4,74
Uppsala	1,53	0,69	0,84
Södermanland	1,14	0,48	0,65
Östergötland	3,42	1,47	1,95
Jönköping	4,00	3,04	0,96
Kronoberg	1,68	1,28	0,41
Kalmar	1,45	1,41	0,04
Gotland	0,02	0,01	0,01
Blekinge	1,71	0,99	0,72
Skåne	6,93	4,64	2,29
Halland	5,56	8,96	-3,40
Västra Götaland	46,47	65,47	-19,00
Värmland	2,45	1,22	1,23
Örebro	2,23	1,06	1,17
Västmanland	1,09	0,45	0,64
Dalarna	1,23	0,72	0,51
Gävleborg	0,72	0,31	0,41
Västernorrland	0,30	0,30	0,01
Jämtland	0,50	0,15	0,35
Västerbotten	0,62	0,03	0,59
Norrbotten	0,55	0,02	0,52
Ospec	9,17	4,81	4,35
Summa:	**100.01%**	**100.01%**	
RESVÄG?	**%**	**Jmf**	**+/-**
Lokalmarknad (0-4 mil)	32,49	49,49	-17,00
Dagsresemarknad (5-19 mil)	23,63	27,97	-4,34
20-30-milscirkeln (20-29 mil)	15,74	10,53	5,21
Distansresemarknad (30+ mil)	28,14	12,00	16,14
Summa:	**100%**	**100%**	
VILKEN DEL AV NORGE?	**%**	**Jmf**	**+/-**
Nordnorge, Trøndelag	5,27	0,00	5,27
Östlandet	76,53	91,76	-15,23
Sörlandet	10,16	3,60	6,56
Västerlandet	8,05	4,64	3,40
Summa:	**100%**	**100%**	

Peak Season 2016 (högsäsong) compared with Pre Season 2016 (försäsong)

Demografi

Period: Säsong | Säsong: Högsäsong 2016 | Jmf: Försäsong 2016

Antal svar: 3638 (Antal besökare: 1070495)

Antal svar jmf: 4134 (Antal besökare jmf: 679606)

Frekvensrapport

HUR LÄNGE STANNADE DU PÅ LISEBERG?	%	Jmf	+/-
0-1 tim	0,18	0,26	-0,08
1-2 tim	0,73	1,78	-1,05
2-3 tim	2,56	5,96	-3,40
3-4 tim	5,16	10,48	-5,33
4-5 tim	7,39	13,50	-6,11
5-6 tim	10,43	14,69	-4,26
6-7 tim	13,33	14,97	-1,63
7-8 tim	13,16	13,33	-0,17
8-9 tim	12,54	9,95	2,60
9-10 tim	34,06	14,91	19,15
Summa:	**100%**	**100%**	
Genomsnittlig besökstid	**7h 33min**	**6h 8min**	
ÄR DU HÄR I SÄLLSKAP MED NÅGON? (MULTISVAR)	**%**	**Jmf**	**+/-**
Ensam	1,02	1,32	-0,29
Familj	87,88	77,83	10,05
Gruppresa	1,48	5,95	-4,47
Jobbet	0,50	2,34	-1,84
Kompis	8,08	12,47	-4,39
Med respektive	6,94	6,49	0,44
HUR GAMMAL ÄR DU OCH DE I DITT SÄLLSKAP?	**%**	**Jmf**	**+/-**
0-6 år	14,99	15,44	-0,45
7-9 år	11,25	10,27	0,98
10-12 år	12,69	12,33	0,36
13-15 år	9,60	7,93	1,67
16-17 år	0,00	0,00	0,00
18-19 år	0,00	0,00	0,00
20-24 år	3,15	3,77	-0,62
25-29 år	3,85	5,02	-1,17
30-34 år	6,40	7,61	-1,20
35-39 år	8,38	8,84	-0,46
40-44 år	9,78	9,96	-0,19
45-49 år	6,34	4,95	1,40
50-54 år	2,96	2,56	0,40
55-59 år	1,29	1,45	-0,16
60-64 år	1,30	1,26	0,04
65+ år	1,85	2,28	-0,43
Summa:	**94%**	**94%**	
Genomsnittligt sällskap	**4.9 personer**	**5.11 personer**	
ÄR DU MAN ELLER KVINNA?	**%**	**Jmf**	**+/-**
Man	45,20	37,40	7,80
Kvinna	54,60	62,12	-7,52
Annat	0,20	0,48	-0,28
Summa:	**100%**	**100%**	
RESSÄTT? (MULTISVAR)	**%**	**Jmf**	**+/-**
Bil	100,00	0,00	0,00
Kollektivtrafik (buss/spårvagn)	0,00	0,00	0,00
Gång	0,00	0,00	0,00
Cykel	0,00	0,00	0,00
Tåg	0,00	0,00	0,00
Flyg	0,00	0,00	0,00
Annat	0,00	0,00	0,00

Geografisk rapport

FRÅN VILKET LAND KOMMER DU?	%	Jmf	+/-
Sverige	91,30	96,80	-5,50
Norge	7,24	2,44	4,80
Danmark	0,80	0,13	0,67
Övriga utlandet	0,66	0,63	0,04
Summa:	**100%**	**100%**	
LÄN?	**%**	**Jmf**	**+/-**
Stockholm	8,74	3,07	5,68
Uppsala	1,24	0,44	0,81
Södermanland	1,84	0,54	1,30
Östergötland	3,78	2,56	1,22
Jönköping	4,71	4,85	-0,14
Kronoberg	1,64	1,57	0,07
Kalmar	1,73	1,91	-0,17
Gotland	0,06	0,14	-0,09
Blekinge	0,75	0,90	-0,15
Skåne	8,81	5,82	2,98
Halland	6,40	7,71	-1,31
Västra Götaland	37,13	57,22	-20,09
Värmland	2,54	2,56	-0,02
Örebro	3,11	2,06	1,06
Västmanland	1,43	0,36	1,06
Dalarna	1,18	0,40	0,79
Gävleborg	0,86	0,44	0,43
Västernorrland	0,59	0,23	0,36
Jämtland	0,29	0,18	0,11
Västerbotten	0,81	0,32	0,49
Norrbotten	0,46	0,12	0,34
Ospec	11,90	6,61	5,28
Summa:	**100.00%**	**100.01%**	
RESVÄG?	**%**	**Jmf**	**+/-**
Lokalmarknad (0-4 mil)	25,41	44,09	-18,68
Dagsresemarknad (5-19 mil)	24,41	26,60	-2,20
20-30-milscirkeln (20-29 mil)	19,20	13,49	5,71
Distansresemarknad (30+ mil)	30,98	15,81	15,17
Summa:	**100%**	**100%**	
VILKEN DEL AV NORGE?	**%**	**Jmf**	**+/-**
Nordnorge, Tröndelag	6,65	5,57	1,09
Östlandet	74,70	84,30	-9,60
Sörlandet	6,32	2,62	3,70
Västerlandet	12,33	7,51	4,82
Summa:	**100%**	**100%**	

Peak Season 2016 (högsäsong) compared with Post Season 2016 (eftersäsong)

Demografi

Period: Säsong | Säsong: Högsäsong 2016 | Jmf: Eftersäsong 2016

Antal svar: 3638 (Antal besökare: 1070495)

Antal svar jmf: 2626 (Antal besökare jmf: 454556)

Frekvensrapport

HUR LÄNGE STANNADE DU PÅ LISEBERG?	%	jmf	+/-
0-1 tim	0,18	0,08	0,10
1-2 tim	0,73	0,90	-0,17
2-3 tim	2,56	4,44	-1,89
3-4 tim	5,16	8,13	-2,98
4-5 tim	7,39	12,04	-4,65
5-6 tim	10,43	12,93	-2,49
6-7 tim	13,33	14,32	-0,99
7-8 tim	13,16	15,31	-2,15
8-9 tim	12,54	12,29	0,26
9-10 tim	34,06	19,21	14,85
Summa:	**100%**	**100%**	
Genomsnittlig besökstid	**7h 33min**	**6h 36min**	
ÄR DU HÄR I SÄLLSKAP MED NÅGON? (MULTISVAR)	**%**	**jmf**	**+/-**
Ensam	1,02	1,42	-0,40
Familj	87,88	88,96	-1,07
Gruppresa	1,48	1,28	0,20
Jobbet	0,50	0,85	-0,34
Kompis	8,08	8,45	-0,37
Med respektive	6,94	4,86	2,07
HUR GAMMAL ÄR DU OCH DE I DITT SÄLLSKAP?	**%**	**jmf**	**+/-**
0-6 år	14,99	16,96	-1,96
7-9 år	11,25	12,60	-1,34
10-12 år	12,69	12,88	-0,20
13-15 år	9,60	7,18	2,43
16-17 år	0,00	0,00	0,00
18-19 år	0,00	0,00	0,00
20-24 år	3,15	2,69	0,46
25-29 år	3,85	3,97	-0,12
30-34 år	6,40	6,91	-0,51
35-39 år	8,38	9,41	-1,02
40-44 år	9,78	10,40	-0,63
45-49 år	6,34	5,35	0,99
50-54 år	2,96	2,74	0,21
55-59 år	1,29	1,44	-0,15
60-64 år	1,30	1,40	-0,09
65+ år	1,85	1,82	0,03
Summa:	**94%**	**96%**	
Genomsnittligt sällskap	**4.9 personer**	**4.75 personer**	
ÄR DU MAN ELLER KVINNA?	**%**	**jmf**	**+/-**
Man	45,20	40,69	4,51
Kvinna	54,60	59,05	-4,45
Annat	0,20	0,26	-0,07
Summa:	**100%**	**100%**	
RESSÄTT? (MULTISVAR)	**%**	**jmf**	**+/-**
Bil	100,00	0,00	0,00
Kollektivtrafik (buss/spårvagn)	0,00	0,00	0,00
Gång	0,00	0,00	0,00
Cykel	0,00	0,00	0,00
Tåg	0,00	0,00	0,00
Flyg	0,00	0,00	0,00
Annat	0,00	0,00	0,00

Geografisk rapport

FRÅN VILKET LAND KOMMER DU?	%	jmf	+/-
Sverige	91,30	96,25	-4,96
Norge	7,24	2,96	4,28
Danmark	0,80	0,11	0,69
Övriga utlandet	0,66	0,67	-0,01
Summa:	**100%**	**100%**	
LÄN?	**%**	**jmf**	**+/-**
Stockholm	8,74	2,15	6,59
Uppsala	1,24	0,35	0,90
Södermanland	1,84	0,27	1,57
Östergötland	3,78	1,82	1,96
Jönköping	4,71	3,70	1,00
Kronoberg	1,64	1,75	-0,11
Kalmar	1,73	1,70	0,03
Gotland	0,06	0,05	0,01
Blekinge	0,75	0,67	0,09
Skåne	8,81	6,32	2,48
Halland	6,40	10,51	-4,11
Västra Götaland	37,13	58,47	-21,34
Värmland	2,54	1,65	0,89
Örebro	3,11	1,83	1,28
Västmanland	1,43	0,74	0,68
Dalarna	1,18	0,57	0,61
Gävleborg	0,86	0,21	0,65
Västernorrland	0,59	0,19	0,39
Jämtland	0,29	0,10	0,19
Västerbotten	0,81	0,07	0,73
Norrbotten	0,46	0,13	0,33
Ospec	11,90	6,74	5,16
Summa:	**100.00%**	**99.99%**	
RESVÄG?	**%**	**jmf**	**+/-**
Lokalmarknad (0-4 mil)	25,41	42,02	-16,61
Dagsresemarknad (5-19 mil)	24,41	31,75	-7,34
20-30-milscirkeln (20-29 mil)	19,20	13,24	5,96
Distansresemarknad (30+ mil)	30,98	12,99	17,99
Summa:	**100%**	**100%**	
VILKEN DEL AV NORGE?	**%**	**jmf**	**+/-**
Nordnorge, Tröndelag	6,65	0,00	6,65
Östlandet	74,70	93,63	-18,93
Sörlandet	6,32	0,00	6,32
Västerlandet	12,33	6,37	5,96
Summa:	**100%**	**100%**	

Peak Season 2015 (högsäsong) compared with Pre Season 2015 (försäsong)

Demografi

Period: Säsong | Säsong: Högsäsong 2015 | Jmf: Försäsong 2015

Antal svar: 5334 (Antal besökare: 1289886)

Antal svar Jmf: 2473 (Antal besökare Jmf: 542005)

Frekvensrapport

HUR LÄNGE STANNADE DU PÅ LISEBERG?	%	Jmf	+/-
0-1 tim	5,36	4,50	0,85
1-2 tim	5,92	9,57	-3,65
2-3 tim	8,51	13,73	-5,23
3-4 tim	10,39	12,80	-2,42
4-5 tim	13,16	14,69	-1,53
5-6 tim	16,66	16,83	-0,18
6-7 tim	16,88	13,99	2,89
7-8 tim	11,02	7,18	3,83
8-9 tim	6,85	4,07	2,78
9-10 tim	5,27	2,56	2,71
Summa:	**100%**	**100%**	
Genomsnittlig besökstid	**5h 14min**	**4h 37min**	

ÄR DU HÄR I SÄLLSKAP MED NÅGON? (MULTISVAR)	%	Jmf	+/-
Ensam	5,02	7,36	-2,34
Familj	56,55	50,39	6,17
Gruppresa	4,12	3,45	0,67
Jobbet	1,18	3,36	-2,18
Kompis	17,98	19,98	-1,99
Med respektive	15,14	15,46	-0,32

HUR GAMMAL ÄR DU OCH DE I DITT SÄLLSKAP?	%	Jmf	+/-
0-6 år	10,08	8,81	1,27
7-9 år	8,23	6,50	1,72
10-12 år	6,47	6,79	-0,32
13-15 år	5,92	7,68	-1,77
16-17 år	0,00	0,00	0,00
18-19 år	0,00	0,00	0,00
20-24 år	6,39	7,67	-1,28
25-29 år	7,18	7,75	-0,56
30-34 år	8,03	9,48	-1,45
35-39 år	11,65	9,81	1,84
40-44 år	10,07	10,38	-0,32
45-49 år	7,52	6,49	1,03
50-54 år	4,34	4,05	0,29
55-59 år	2,80	3,07	-0,27
60-64 år	2,57	2,30	0,27
65+ år	2,76	2,33	0,43
Summa:	**94%**	**93%**	
Genomsnittligt sällskap	**4.44 personer**	**2.61 personer**	

ÄR DU MAN ELLER KVINNA?	%	Jmf	+/-
Man	45,24	50,21	-4,97
Kvinna	54,76	49,79	4,97
Annat	0,00	0,00	0,00
Summa:	**100%**	**100%**	

RESSÄTT? (MULTISVAR)	%	Jmf	+/-
Bil	0,00	0,00	0,00
Kollektivtrafik (buss/spårvagn)	0,00	0,00	0,00
Gång	0,00	0,00	0,00
Cykel	0,00	0,00	0,00
Tåg	0,00	0,00	0,00
Flyg	0,00	0,00	0,00
Annat	0,00	0,00	0,00

Geografisk rapport

FRÅN VILKET LAND KOMMER DU?	%	Jmf	+/-
Sverige	81,87	91,63	-9,76
Norge	10,84	4,85	5,98
Danmark	2,39	1,02	1,38
Övriga utlandet	4,90	2,50	2,40
Summa:	**100%**	**100%**	

LÄN?	%	Jmf	+/-
Stockholm	7,92	2,79	5,14
Uppsala	1,05	0,55	0,50
Södermanland	1,51	0,34	1,17
Östergötland	3,06	2,08	0,98
Jönköping	3,41	2,95	0,45
Kronoberg	1,33	0,99	0,34
Kalmar	1,44	1,03	0,41
Gotland	0,17	0,14	0,03
Blekinge	0,55	0,76	-0,21
Skåne	7,05	2,91	4,14
Halland	4,38	4,78	-0,41
Västra Götaland	48,36	67,29	-18,92
Värmland	2,24	1,41	0,83
Örebro	2,08	1,32	0,77
Västmanland	1,28	0,47	0,81
Dalarna	1,11	0,26	0,85
Gävleborg	1,11	0,05	1,06
Västernorrland	0,69	0,24	0,46
Jämtland	0,33	0,17	0,16
Västerbotten	0,83	0,18	0,64
Norrbotten	0,61	0,14	0,47
Ospec	9,49	9,16	0,33
Summa:	**100.00%**	**100.01%**	

RESVÄG?	%	Jmf	+/-
Summa:	**0%**	**0%**	

VILKEN DEL AV NORGE?	%	Jmf	+/-
Nordnorge, Tröndelag	7,08	10,67	-3,59
Östlandet	59,84	63,46	-3,62
Sörlandet	15,59	8,83	6,77
Västerlandet	17,48	17,05	0,44
Summa:	**100%**	**100%**	

Peak Season 2015 (högsäsong) compared with Post Season 2015 (eftersäsong)

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Demografi

Period: Säsong | Säsong: Högsäsong 2015 | Jmf: Eftersäsong 2015

Antal svar: 5334 (Antal besökare: 1289886)

Antal svar jmf: 1830 (Antal besökare jmf: 418461)

Frekvensrapport

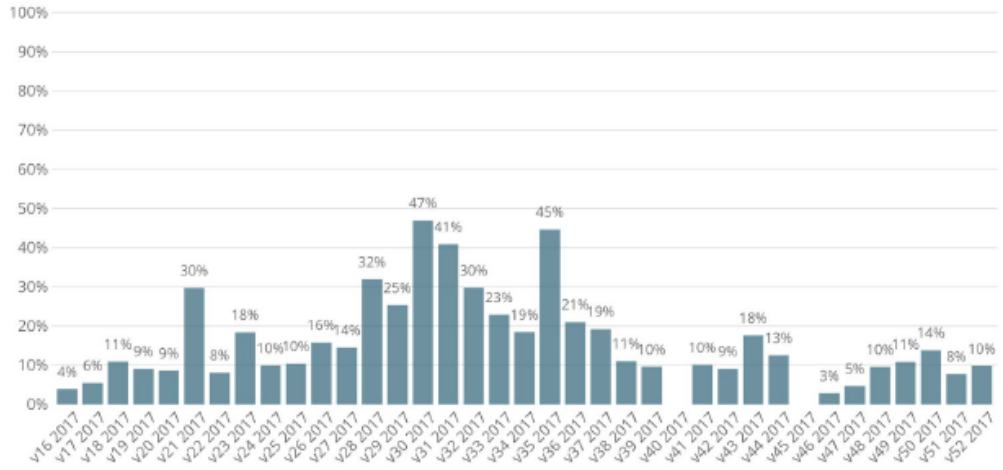
HUR LÄNGE STANNADE DU PÅ LISEBERG?	%	Jmf	+/-
0-1 tim	5,36	3,21	2,15
1-2 tim	5,92	7,95	-2,03
2-3 tim	8,51	11,94	-3,43
3-4 tim	10,39	15,32	-4,94
4-5 tim	13,16	16,49	-3,33
5-6 tim	16,66	18,34	-1,69
6-7 tim	16,88	14,73	2,15
7-8 tim	11,02	8,34	2,68
8-9 tim	6,85	1,47	5,38
9-10 tim	5,27	2,21	3,06
Summa:	**100%**	**100%**	
Genomsnittlig besökstid	**5h 14min**	**4h 38min**	
ÄR DU HÄR I SÄLLSKAP MED NÅGON? (MULTISVAR)	**%**	**Jmf**	**+/-**
Ensam	5,02	5,04	-0,02
Familj	56,55	54,66	1,89
Gruppresa	4,12	2,14	1,98
Jobbet	1,18	1,47	-0,29
Kompis	17,98	16,45	1,54
Med respektive	15,14	20,24	-5,10
HUR GAMMAL ÄR DU OCH DE I DITT SÄLLSKAP?	**%**	**Jmf**	**+/-**
0-6 år	10,08	11,56	-1,48
7-9 år	8,23	9,81	-1,58
10-12 år	6,47	5,93	0,53
13-15 år	5,92	4,24	1,68
16-17 år	0,00	0,00	0,00
18-19 år	0,00	0,00	0,00
20-24 år	6,39	5,46	0,93
25-29 år	7,18	8,04	-0,86
30-34 år	8,03	8,36	-0,33
35-39 år	11,65	11,66	-0,01
40-44 år	10,07	10,68	-0,62
45-49 år	7,52	6,56	0,96
50-54 år	4,34	4,52	-0,18
55-59 år	2,80	3,08	-0,28
60-64 år	2,57	1,79	0,78
65+ år	2,76	3,52	-0,76
Summa:	**94%**	**95%**	
Genomsnittligt sällskap	**4.44 personer**	**4.74 personer**	
ÄR DU MAN ELLER KVINNA?	**%**	**Jmf**	**+/-**
Man	45,24	42,01	3,23
Kvinna	54,76	57,99	-3,23
Annat	0,00	0,00	0,00
Summa:	**100%**	**100%**	
RESSÄTT? (MULTISVAR)	**%**	**Jmf**	**+/-**
Bil	0,00	0,00	0,00
Kollektivtrafik (buss/spårvagn)	0,00	0,00	0,00
Gång	0,00	0,00	0,00
Cykel	0,00	0,00	0,00
Tåg	0,00	0,00	0,00
Flyg	0,00	0,00	0,00
Annat	0,00	0,00	0,00

Geografisk rapport

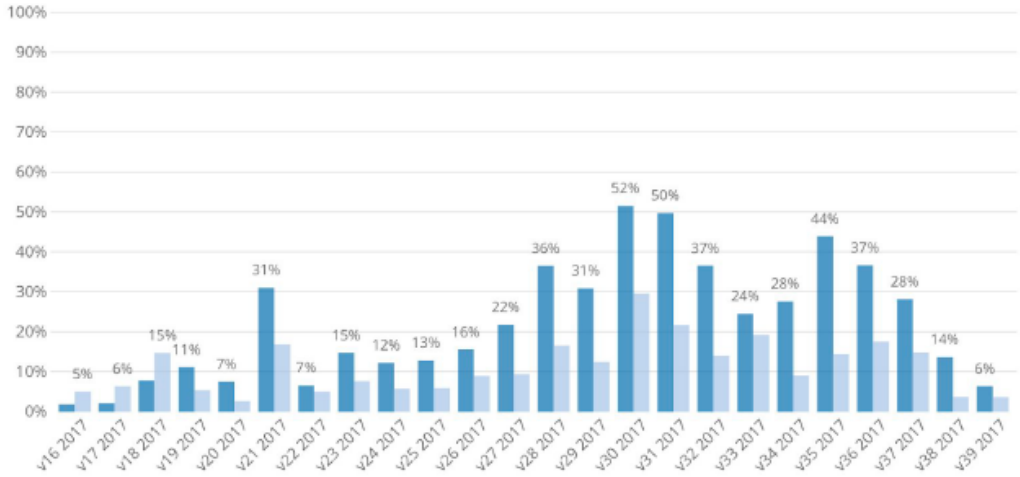
FRÅN VILKET LAND KOMMER DU?	%	Jmf	+/-
Sverige	81,87	92,13	-10,26
Norge	10,84	4,67	6,17
Danmark	2,39	0,26	2,13
Övriga utlandet	4,90	2,95	1,96
Summa:	**100%**	**100%**	
LÄN?	**%**	**Jmf**	**+/-**
Stockholm	7,92	2,30	5,62
Uppsala	1,05	0,58	0,47
Södermanland	1,51	0,46	1,05
Östergötland	3,06	1,54	1,51
Jönköping	3,41	2,72	0,69
Kronoberg	1,33	1,58	-0,25
Kalmar	1,44	0,74	0,70
Gotland	0,17	0,00	0,17
Blekinge	0,55	0,42	0,12
Skåne	7,05	3,64	3,41
Halland	4,38	6,24	-1,86
Västra Götaland	48,36	65,89	-17,53
Värmland	2,24	0,89	1,36
Örebro	2,08	1,34	0,74
Västmanland	1,28	0,30	0,99
Dalarna	1,11	0,63	0,48
Gävleborg	1,11	0,24	0,87
Västernorrland	0,69	0,26	0,43
Jämtland	0,33	0,00	0,33
Västerbotten	0,83	0,48	0,35
Norrbotten	0,61	0,28	0,33
Ospec	9,49	9,47	0,02
Summa:	**100.00%**	**100.00%**	
RESVÄG?	**%**	**Jmf**	**+/-**
Summa:	**0%**	**0%**	
VILKEN DEL AV NORGE?	**%**	**Jmf**	**+/-**
Nordnorge, Trøndelag	7,08	6,58	0,50
Östlandet	59,84	74,58	-14,73
Sörlandet	15,59	9,40	6,20
Västerlandet	17,48	9,45	8,03
Summa:	**100%**	**100%**	

Percentage of visitors ranking the queuing experience 1 or 2 out of 5 per week during

the summer season 2017



Percentage of visitors per week ranking the queuing experience at attractions (dark blue) and entrance (light blue) 1 or 2 out of 5 during the summer season 2017



G

Insight Statements and HMW questions

Insight statements

If the distribution of guests over time and attraction were more even, it would give guests a better experience due to shorter waiting times and give Liseberg increased business opportunities.

The queuing experience at Liseberg affects the visitors' perceptions and opinions of getting their money's worth

The expectations on the waiting times affects the guests experiences during waiting. Liseberg is unable to provide accurate estimations that creates realistic expectations.

Social interactions (guest-guest) play a big part of people's motivation to visit Liseberg. Furthermore, social interactions (guest-guest, guest-employee, employee-employee) also affect the Liseberg experience in general, and queuing experience in particular.

Physical discomfort, such as lack of space, crowding and invasion of personal space, affects the guests experience negatively.

Liseberg is unable to present visitors with the correct information at the right time. This results in longer waiting times and higher amount of agitated and annoyed visitors.

To avoid boredom in queues, visitors try to keep themselves distracted using several different tactics.

Waiting in line makes visitors bored and disgruntled, but the boredom can turn to anger if their "invested" time doesn't result in anything, for example if an attraction breaks down.

How Might We - Questions

How might we:

… improve the queuing experience by distributing guests through social incentives?

… use social interaction to distract guests in a queue?

… distribute guest better across park attractions?

… improve the queuing experience by providing information that helps visitors make optimal decisions in regards to queuing?

… give guests realistic expectations about their queuing experience?

… deliver the information needed in order to provide guests with expectations that will improve their experience of Liseberg?

… distract guests during waiting to avoid boredom?

… use social interactions to make the time standing in line seem shorter?

… distribute guests better across opening weeks?

… prevent feelings of anger and confrontations when an attraction breaks down? **(Not used)**

… make waiting in line as fun as riding an attraction? **(Not used)**

… use distractions to distribute guests throughout the park? **(Not used)**

… minimize the time guests have to stand in line at Liseberg?

H

Design requirements

Opportunity or Problem	Area	Problem or opportunity	Description	Source		Design principle / requirement: *The solution should be able to...*
	Queuing (general)					
P		Queues creates negative emotions	People feel several negative emotions when queuing, such as boredom, uncertainty, restlessness and lack of motivation.	KJ (contextual interviews)		prevent feelings as boredome, uncertanty, restlessness and lack of motivations for guests standing in queues
			Visitors also feel queues and waiting long times itself is problematic.	KJ (contextual interviews)		prevent queues and minimise objective waiting times throughout the park
O		Guests accept some queue time depending on the situation	Visitors accept a varied amount of queue time depending on the situation. For example, novelty (e.g a new rollercoaster) can increase motivation to queue for longer.	KJ (contextual interviews)		utilize or facilitate situations and events that increase the guests motivation to queue (e.g novelty)
P		Guest get less for their money (monetary value)	Visitors feel that the waste money if they purchase an expensive ticket and can't experience attractions due to long queues. Visitors strive to get the their money's worth at Liseberg.	KJ (contextual interviews)		make guests feel they get value from the bought tickets independent on current guest intensity and total amount of queueing time
		Guests try to distract them selves during waiting time	Visitors look at their phone, talk to friends, and more to fill their time while queuing.	KJ (contextual interviews)		allow the guests to fill their time during queueing
						persuade the guests to fill their time during queueing
		There are long lines to attractions	Surveys performed by Liseberg states that queuing is one of the largest problems according to their guests.	Liseberg Management interview		minimise the actual waiting time and queues to attractions
						minimise the perceived waiting time and queues to attractions
O		Queues represent high interest	Longer lines to attractions can indicate popularity or validate its quality and mayattract guests even though the waiting times are long.	Liseberg Management interview		validate quality and attract guests
O		Current line areas holds many people	There are some positive consequences for the park by having long queues to attractions within the park. As an example, the rest of the park including restaurants and other entertainment would be more crowded if people did not have to physicallystand in line while waiting for their turn to ride attractions.	Liseberg Management interview		be applied at Liseberg without substantially increasing crowding throughout the park
		Monetary loss for Liseberg due to long lines	Guests that are queuing inside the waiting areas to ride attractions are unable to consume any other of Lisebergs other offerings. With less queues Liseberg earn more.	Liseberg Management interview		be applied without decreasing the ability for customer to consume
		Queueing is a major thing decreasing visitors experience	Figure 6.8 shows how many percentages (4-47%) that ranks the general queuing experience a 1 or 2 out of a 5 point scale	GUNDE 2.0		
		There are a small number of attractions where the queueing issue is very large		Liseberg Management interview		minimise the actial waiting time to the top attractions
						minimise the perceived waiting time to the top attractions
		Some alternative of todays physical queues should be possible for guests	Liseberg do think that they will need to keep the (some version of current alternative with physical queueing. They are not sure guests are 100% ready to only have digital solutions.	Liseberg Management meeting 2		work in co-existance with lisebergs current physical queueing systems, expresspass system and single rider system (or replace)
			To have physical (long) lines can be good in order to max-load the service	Liseberg Management meeting 2		allow services throughout the park to work at full capacity
	Estimating waiting time					
		There might not be very accurate estimations of waiting times to attractions	The estimation of attractions waiting times is done manually by the personell at the attractions.	Liseberg Management interview, Employer interviews		give Liseberg the ability to provide accurate estimations of waiting time
			The employees have a sheat cheet with estimations and guess on waiting times based on this paper	Employer interviews		
			Depending on the attraction, employees either use a tablet-app to set the visible queue-time estimation, or call attraction management and tell them the current estimation	Employee work day summary		
			There is a relatively linear relationship between people in the park and attraction queues	Liseberg Management meeting 3 (telephone Johan)		
		The number of people visible in the queue is not an accurate estimation of actual queue time	Queues can have long lines, but since the time it takes to process a ride is fast, the queue moves fast and have a short waiting time. Guests might not realize this and think the line is way longer than it actually is	Summary employee interviews (queues)		acurately communicate queue times instead of making guests assume it by looking at possibly irrelevant factors such as amount of people
	Estimating park guests					
		There are not a sytem for "green days" on Lisebergs website, showing lower visitor amounts	Liseberg do not collect much external data around weather, events, schools, or other factors affecting visitor amount.	Liseberg Management meeting 2		use more data sources in order to create better estimations of park guests, to provide realistic information
			The green days are not consistant across the season.	Liseberg Management meeting 2		guide guests in decision making regarding when to visit the park
			All days in June and July are red except sundays. There are less people in the beginning of the weeks than on a saturday. A sunday in July is around double amount of guests than in may (still both are same green colour)	Liseberg Management meeting 2		accurately communicate park guests estimations through the seasons
		People want information about park opening hours and estimation of park guests	The opening-hours pages are the most used at the website, according to liseberg it feels like people want to take part of information around how many guests liseberg are expecting.	Liseberg Management meeting 3 (telephone Johan)		allow guests to collect information about park opening hours and estimation of park guests
		Employees are aware and use the knowledge of of the estimated number of guest to adjust service	Employees receive information about the expected amount of visitors that will be in the park that specific day	Employee work day summary		allow employees to access information regarding guest estimations that can be used to give the best service
			Employees adjust queue areas depending on the days guest estimations	Employee work day summary		
	Expresspass					
		Average of 2 days planning ahead when buying online	Guests are usually buying the expresspass 2 days before their visit.	Liseberg Management meeting 2		allow guests to pre-buy entrance and tickets
		Guests sees the benefits of the express pass and wants to use it	Everyone (99.9%) buys express-pass when they buy tickets all-in-one package online.	Liseberg Management meeting 2		communicate queue passing opportunities efficiant to guests
		Express pass helps distribute guests across days	Peak days and seasons have fewer or no express passes available			create a more even distribution of guests across seasons
			Is the expresspass slots already filled up, the online sales goes down those days.	Liseberg Management meeting 2		
		Guests with expresspass can accept some queue time	In some cases guests standing in the express pass line can oversee their ride being delayed in favor of other visitors. They find the waiting tolerable because they got to skip the ordinary line	Summary employee interviews (queuing)		-
		The placement of the expressline is problematic at some attractions	Expresspass has their own line. However, its placement can be problematic for employees since you might need to stop your ordinary tasks, break the line and take care of these guests specifically	Summary employee interviews (queuing)		be applied without increasing the workload by introducing out-of-the-ordinary work tasks that needs to be handled individually
		There has been efforts to digitalize the expresspass entrance	Liseberg installed a QR-reader that allowed visitors to scan their express pas without interacting with employees. The reader rarely functioned properly and guests had a hard time using it	Summary employee interviews (queuing)		
			The sun shining on the reader made it unusable	Summary employee interviews (queuing)		function properly under varied and changing conditions
			Liseberg management said that they have updated the scanners and that the scanning is easier now, and functions properly	Liseberg Management meeting 2		

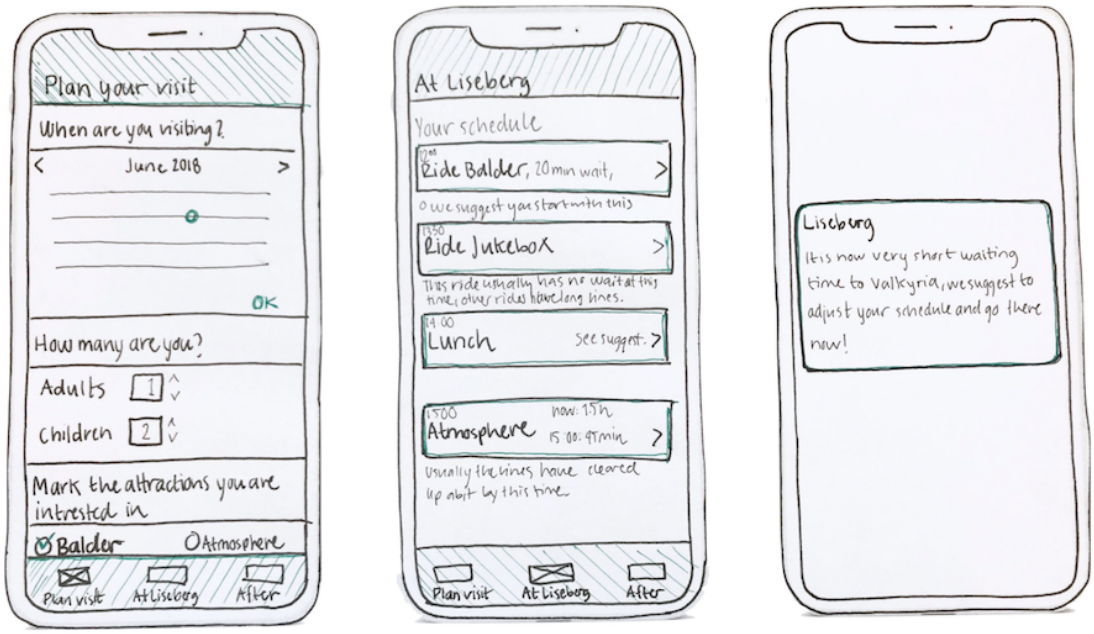
		Only some of the attractions have express pass	The most popular attractions are: balder, helix, lisebergsbanan, valkyria, loke, mechanica. It is the ones with expresspass.	Liseberg Management meeting 2		
	Queueing (entry specific)					
P		Uncertainty of placement in line	Visitors think it is problematic if there is no clear queue and one's position in it is not certain.	KJ (contextual interviews)		Enable users to clearly understand placement in line
		Guests do not know what possibilities they have when entering the park	Guests approaching the entrance are unsure about their different alternatives re-garding where to buy certain tickets or entrance passes. Also, they are uncertainabout what entrances they are allowed to use if they have earlier purchased ticketsor passes.	Liseberg Management interview		guide guests to the most efficiant entrance alternative (for the guest herself, all other guests and employees) based on the guests ticket situation
			Guests do not know which entrance they can use. An example is that many guests do not know that they can take the large entrance if they have the yearly card, which let them skip the entry queues.	Liseberg Management interview, KJ (contextual interviews)		
			Park hosts needs to direct and coordinate guests to go to the correct entrances	Summary employee interviews (queuing)		
			Guests stand in line where others stand in line, even if theres a register without a line	Summary employee interviews (queuing)		
		Guests express vocal complaints about the queuing experience at the entrance	Employees receieve complaints about the ticket prices and queue times when working at the register. This can be a negative experience	Summary employee interviews (queuing)		make it easy to handle eventual complaints in a professional manner
						minimise eventual complaints regarding ticket price and queue time
			Families with kids are usually the ones complaining about queue times			reduce actual queuing time for larger companies as families (with kids)
						reduce perceived queuing time for larger companies as families (with kids)
			There was a larger amount of troublesome guests when the lines were long rather than short			minimize lines
	Planning visit					
O		Expecting queues and waiting	Visitors expects their Liseberg visit to include queuing and waiting.	KJ (contextual interviews)		use their expectations of queues to manage their sentiments towards queuing
O		Guests plan visit to avoid crowds and queues	Guests plan their visit beforehand in order to reduce waiting times and avoid crowds, For example, by going before or after peak seasons.	KJ (contextual interviews)		allow guests to make informed decisions to choose seasons and days with lower amount of guests
	Behaviour in park					
O		Guests choose attractions to avoid long lines	Guests make conscious choices to avoid queues while being at Liseberg, by looking at queue time estimations to choose attractions with less waiting time.	KJ (contextual interviews)		Help users to make informed decisions inside the park to avoid long waiting times
						Minimise the waiting times for guests in the park
	Physical discomfort					
P		Lack of space to move and places to sit/lean affect guests comfort negatively	High amount of people affects the visitors negatively. They feel that the lack of space, mainly while queuing, is problematic since they can not move freely. Also the lack of places to sit/lean can be uncomfortable.	KJ (contextual interviews)		prevent or minimize physical discomfort
	Social					
O		Guests see social interaction as an important part of Liseberg experience	Visitors think it's important to have other people with them when they queue since it makes waiting more meaningful. Visitors primarily visit Liseberg in groups.	KJ (contextual interviews)		allow social interacitons amongst visiting companies
		Liseberg understands that guests visit the park in groups	Employees are not supposed to break up groups of guests at the attractions, for example when dealing with express pass queue management	Summary employee interviews (queues)		allow groups to stay together
		Employees value social interaction with other employees	Employees are not supposed to break up groups	Summary employee interviews (experiences)		allow positive employee to employee interactions
		Employees work day is affected by interactions with guests	Employees describe that their work is greatly affected by the behavior of guests. Problematic interactions are severly negative, but positive interactions can brighten the day. Examples of problematic interactions are people being angry when attractions break down or complain about the entrance prices	Summary employee interviews (experiences)		allow positive employee to guest interactions
		Keep track and stay together of once company	Visitors are afraid of loosing their children / family members if there is crowded.	Contextual interviews		enable guests to keep track of family members inside the park
	Handling children					
		Keep children in good mood	Visitors with children feel they need to keep the children in good mood when waiting in lines.	KJ (contextual interviews)		minimise the risk of children having negative moods throughout their Liseberg visit
		Keep track of once children	Visitors are afraid of loosing their children / family members if there is crowded.	Contextual interviews		enable guests to keep track of family members inside the park
	Disturbing surroundings					
		Annoying people	Visitors might think other visitors or kids are annoying, if running around and not behaving properly.	KJ (contextual interviews)		minimise the risk for guest to be disturbed by other guests
	Distribution of guests					
		Uneven distribution across attractions	A few attractions are over represented regarding problems with long waiting times, whereas other attractions at the same given time has short waiting times. E.g. during peak season it can be 1 h to Helix but 15 minutes to Jukebox.	Liseberg Management interview		distribute guests more even across attraction inside the park
			The most popular attractions are: balder, helix, lisebergsbanan, valkyria, loke, mechanica. It is the ones with expresspass.	Liseberg Management meeting 3 (telephone Johan)		
		Uneven distribution across seasons	There is an uneven distribution over days and weeks during the summer season.	Liseberg Management interview		distribute guests more even across seasons, weeks and days
			During 2017 there was in total 1,110,510 visitors during peak season, and 621,436 in total during preseason, which is an increase with 44 ⅛	GUNDE 2.0		
			There is around 5000 guests / day during pre season and maybe 25-30 000 guests/day during peak season. Liseberg mentions it would be nice to move 10.000 guests per day from peak season to pre season.	Liseberg Management meeting 3 (telephone Johan)		
	Company and demographics					
		People are visiting liseberg in large groups of people	The average amount of people in a company visiting liseberg together is 4.59-4.66	GUNDE 2.0		enable handling of large group sizes
		Many of Liseberg's visitors are young	The ages 0-6 constitutes of 14,41% of the total visitor amount, 7-9 years: 9,12%, 10-12 years: 9,72 %, (peak season 2017)	GUNDE 2.0		
		Most common constitutions of visitors are families	Families are the biggest group of guests, constituting for about 70% of the total amount of visitors during summer.	GUNDE 2.0		enable parents to manage their kids' experiences at Liseberg
		Many of the visitors are from the close by area of Gothenburg	78,27% of pre-season guests, and 56,12% of peak seasons guests, are living close to Gothenburg (within 200km).	GUNDE 2.0		
		Average visit time is 5h 15 min - 6h 47 min (2017)		GUNDE 2.0		be applicable through the entire, or some parts, of the hours at Liseberg

	Different tickets					
		The amount of ticket possibilities can be confusing to guests	Since they have different passes, tikets and require different amount of tickets due to attraction - it can be a bit confusing to guests knowing what to buy to fit their need and wants	Liseberg Management interview		guide the guest in what ticket/entrance/pass fits her need and situatuation the best to the best price
			There are signs that tell visitors at the entrance what tickets to purchase. However, these can be hard to understand, especially for first time visitors	Employee work day summary		
			Employees at the entrance needs to inform and guide visitors to the right tickets if they are unsure about what to purchase	Employee work day summary		
		Guests uncertainty around tickets and what to purchase increase the queuing time to the entrance	There's a 50/50 split between guests that know what they want to purchase before arriving to the register and those that don't. Guests that know what to purchase can be processed in about a minute, guests that don't can take up to 5 minutes	Employee work day summary		help guests make a decision about what ticke they want before arriving at the register, in order to reduce the queue time at the entrance
	Breaks	It is not unusual that attractions breaks down for some times and are paused for different amounts of time	Attractions can break down for multiple reasons, resulting in various amounts of downtime. Large amounts of downtime requires the employees to clear the queuing area	Liseberg Management interview		allow employees to effectivly deal with breakdowns
			Liseberg management feel that some systems available would force Liseberg to adjust to them if implemented. They feel many current systems not have a solution on edge-cases; that there shoudl be a system to handle breaks (e.g. a person is in a virtual queue, wha thappens when the attraction is down?	Liseberg Management interview		
		Breakdowns are often negative for guests	Guests sometimes become agitated when attractions break down, especially if they have been standing in line for a long time	Employee work day summary		guide the guest in the event of delays
			Guests sometimes demand compensation when an attraction breaks down			help the guest feel compensated in situations where they feel invested time or money are not giving enough value back
		Breaks can be both a positive and negative experience for employees	Attractions breaking down can provide employees with a opportunity to rest during the hectic workday	Employee work day summary		
			Employees expressed that it can be stressfull to handle angry guests that have been waiting for a long time	Summary employee interviews (experiences)		help the employees manage guest in the event of delays
	Attractions	Some times the attraction rides with empty seats even though the line is long	Even when lines are long, Liseberg needs to run attractions sith some seats empty. This is since it takes longer time to find single riders in the queue than just start the attracitons. Some attractions (e.g. valkyria) have single riders queue.	Liseberg Management interview		help attraction employees operate the attractions at full capacity
		Some situations require the attraction to function with reduced staff	Employees describe that it can be stressfull to adjust the queuing area during peak season, beucase the attraction needs to operate as normal but with one less person working on it	Employee work day summary		allow the employees to operate the attractions without being distracted or feel stressed by additional workload
		Attractions have different numbers of employees operating it	Depending on the attraction, there's eiter multiple employee handling the attraction, or one employee handling everything	Employee work day summary		allow both single employee attractions and multiple employee attractions to function properly
		Attraction employees rotate positions and attractions	Throughout the work day, employees switch places and change attractions	Employee work day summary		adapt to change in employees at an attraction
	Branding	Liseberg want to be a "nice" company	Liseberg sees themselves as a nice fair company rather than a company that only focus on maximising their revenue.	Liseberg Management meeting 2		be applied without introducing paid-, or other unfair advantages to specific guests
			Liseberg do not want to charge people more in order to make them skip lines	Liseberg Management interview		
	Passing time					
		Employees wants to be occupied during a work day	Employees described that days where they have a lot to do pass quicker than days when there's slow tempo	Summary employee interviews (experiences)		stimulate and help the employees with their daily tasks to a level where the employees feel they are occupied to a comfortable degree
	Mobile application	Lisebergs current mobile application has the main fuction of displaying the current queueing estimations but are developing a new app at the moment	The new mobile application will also allow guest to store their lisebergs card digitally, have a "my page" where guests can change and keep track of current express pass slots. Also maybe connect other values connected to Lisebergskortet.	Liseberg Management meeting 3 (telephone Johan)		co-exist and/or develop further alongside Lisebergs future mobile application as well as other digital services
	Cash usage	Many of lisebergs current games (chokladhjul etc) depends on the guests to have cash, which might not always be the case	Liseberg see some future in digitalising the "Femkamp" and the ride-tickets (åk-kuponger)	Liseberg Management meeting 3 (telephone Johan)		allow the guests to use the most convinient payment solution to pay for a service
	Risks					
		There are situations in the park that affect personal safety	Employees described that it can be uncomfortable situations happening, such as kids trying to jump out of the attraction, attractions where you can get pinched, or people fainting in the queue	Summary employee interviews (experiences)		allow visitors and employees to feel and be safe, as well as react to risky situations
		There have been situations where people try to scam the entrance employees	One employee desribed that there has been events were people try to trick the employees working the registers to hand out more change than necessary. However, the employees have deployed routines to prevent this from happening			allow Liseberg and its employees to handle scamming, or other atempts to avoid paying for services
			Employees attach the armband to the guests themselves to prevent people from giving it to others			
	Lines affect on employees					
		Employees don't feel stressed about working when there's lines	Employees work as fast as they can to handle as many people as possible, but they do no feel stressed about the long lines. There work speed is also affected by external factors, such as the frequency of wagons at the attraction	Summary employee interviews (queueing)		facilitate employees in completing their work tasks efficently without increasing their stress
	Other					
		Justifiable economically	-			be justifiable from an economical perspective
			Data suggest that queuing to attractions is a larger issue than queuing at the entrance during the summer season 2017	GUNDE 2.0		
			Not all visitors have a smart phone			not demand all guests to use smart phones

I

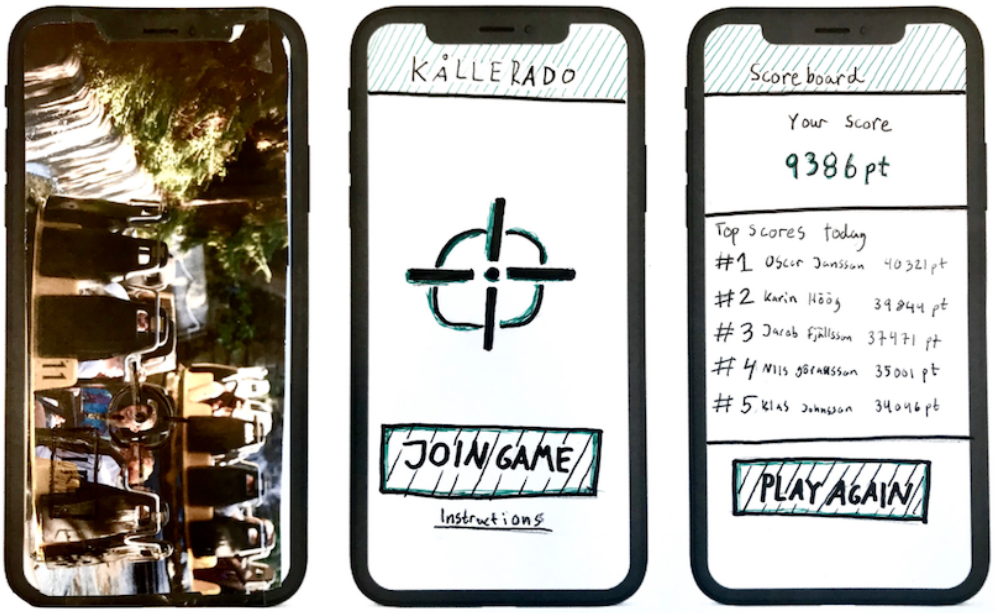
Initial concepts

Visit planning service
This concept aims to address the problem area of the uneven distribution of guests across seasons, that leads to long waiting times during peak season. Also, it aims to address the lack of information accessible to guests, which hinder guests from making informed decisions regarding their visit. The concept includes a mobile application, helping the guests to plan their visit based on smart guest and waiting line estimations. With this concept, guests can schedule their day at Liseberg, which feeds data into the system, enabling better estimations and better suggestions to guests.



The interactive attraction
This concept aims to target the found problems regarding negative emotions while waiting in lines to attractions. The idea is to create a service, either a mobile application, a website or a form of installation that allows visitors to interact with the attraction itself, and the people riding it. The concept creates a pleasant distraction that influence the perceived waiting time for the guests. Also, it has the potential to

be designed as a social facilitator that guests can experience together. In the figure **??** one example of this is sketched, where the guests can interact with the Kållerado attraction and shoot water during other guests rides.



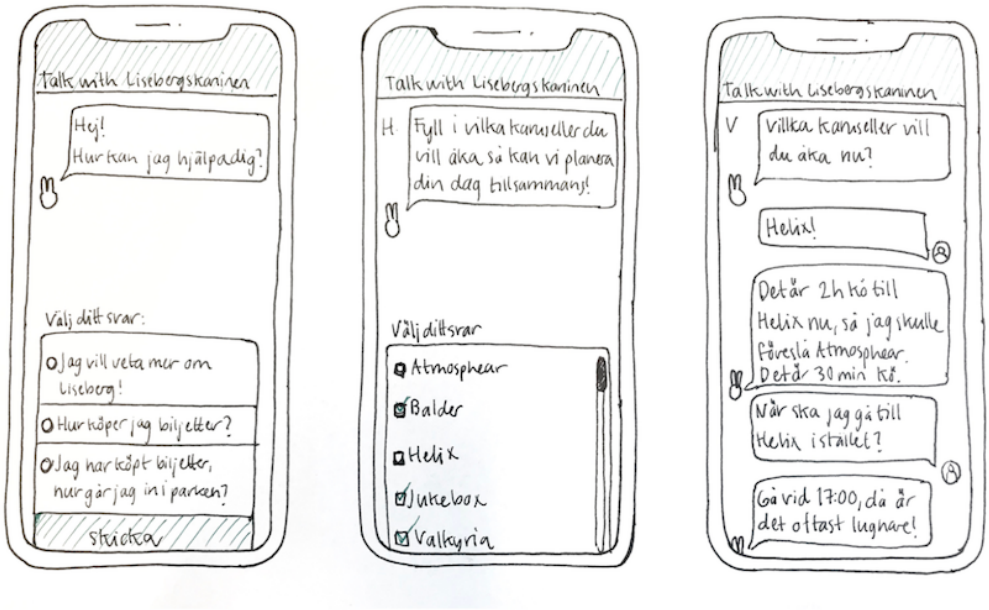
AR Game

The concept Augmented reality game target the problem with the uneven distribution of guests across attractions inside the park. This concept, which is a game, aims to give guests a new fun experience at Liseberg while at the same time distribute guests inside the park, with different incentives inside the game. As an example, points to be collected in the game could be distributed across the park to guide guests to ride attractions with less waiting time.

Data aggregation tool

This concept is based on collecting more data and develop a tool for employees at Liseberg, where they can monitor the data and create a process of working more data driven. Such a system could include visitor information, history, predictions and a decision-making support system through collection of internal and external data. As of today, Liseberg do not collect much data regarding queuing times for different attractions, hence can not make smart predictions or estimations. Moreover, they do not communicate this information to a large extent, which could be beneficial to Lisebergs guests.

Lisebergskaninen 2.0
One of the key insights from research was that visitors lack information they can use to make decisions in regards to their queuing experience. The concept Lisebergskaninen 2.0 aimed to solve this problem by introducing a digital tool, a chatbot, that helps visitors to plan their visit and gather relevant knowledge. Visitors can use the tool before their visit to research Liseberg and its content, and during the visit as a guide that helps them get the best experience.


Talk with Liseborgskaninen
Hej!
Hur kan jag hjälpadig?
Välj ditt svar:
Jag vill veta mer om Liseborg!
Hur köper jag biljetter?
Jag har köpt biljetter, hur går jag in i parken?
Skicka
Talk with Liseborgskaninen
H
Fyll i vilka karuseller du vill åka, så kan vi planera din dag tillsammans!
Välj ditt svar
Atmosphear
Balder
Helix
Jukebox
Valkyria
Talk with Liseborgskaninen
V
Villka karuseller vill du åka nu?
Helix!
Det är 2h kö till Helix nu, så jag skulle föreslå Atmosphear. Det är 30 min kö.
När ska jag gå till Helix istället?
Gå vid 17:00, då är det oftast lugnare!

J

Concept interviews

Liseberg Research

On demand - åkaren

Mål:

- Undersöka när och varför gäster besöker Liseberg, om de planerar eller går spontant
- Ta reda på vad som kan få dem att ändra tider för besök
  - Expresspass, rabatter, andra fördelar?
- Vad är det som får gäster att återkomma till Liseberg?
  - *Om det får åka alla attraktioner de vill under försäsongen, vill de åka dem igen under högsäsong?*
- Ta reda på om besökare stannar längre på Liseberg för att få valuta för pengarna de spenderat på åkband
- Undersöka när besökare känner att de har fått valuta för pengarna
- Hur negativa känslor kring köande hör ihop med att få valuta för pengarna
- Ta reda på om gäster är medvetna om skillnaden i mängden gäster mellan hög- och lågsäsong

Intervju:

- Har du varit på Liseberg under sommaren den senaste tiden?
  - När under sommaren var du där?
  - Varför var du där just den tiden?
  - Var besöket planerat eller oplanerat?
    - Om planerat, hur valdes tiden för besöket?
  - Har du varit på Liseberg fler gånger under samma sommar någon gång?
    - Om ja, vad fick dig att återkomma fler gånger? Gjorde du någonting annorlunda vid de olika besöken?

- Hur länge stannar du på Liseberg på ett ungefär?
  - Varför stannar du den tiden?
  - Vilka faktorer påverkar längden på ditt besök?
    - Om inget tydligt svar, Hur påverkar kostnaden av ett Lisebergsbesök längden på ditt besök?

- Känner du att du får valuta för pengarna spenderade på entre/åkband på Liseberg?
  - Varför/varför inte?
  - Hur gör du för att försöka få valuta för pengarna?
  - Påverkar köer din känsla av att få valuta för pengarna?

- Hur tror du antalet besökare på Liseberg skiljer sig mellan hög- och lågsäsong?
- Vilka faktorer hade gjort dig intresserad av att besöka Liseberg under lågsäsong istället för högsäsong?

    - Möjlighet att få extra expresspass?
    - Rabatter?
    - Mer?
- Hur ställer du dig till möjligheten att betala en mindre summa pengar (mindre än åkpass) för att åka enstaka attraktioner under lågsäsong?
    - Hur mycket skulle du kunna tänka dig att betala för att åka din favoritattraktion?
        - Varför det priset?

Virtuella köer

Mål:

- Undersöka hur gäster ställer sig till konceptet virtuella köer.
- Ta reda på vilka aktiviteter de hade gjort istället för att stå i kö.
- Undersöka hur de känner kring ökade folksamlingar i parken
- Undersöka vilka attraktioner de skulle ställa sig i virtuell kö till, och varför
- *Något om grupper och hur de hanteras*
- *Något om "rättvisa" och hur de ställer sig till det*

Intervju:

- Vad gör du på Liseberg när du inte står i kö till attraktioner?
- Hur upplever du mängden folk och folksamlingar på Liseberg under högsäsong
    - Hur hade en ökande mängd folk/folksamlingar påverkat ditt besök?
- Vilka attraktioner brukar du helst vilja åka under ett besök?
    - Varför just dom attraktionerna?
    - Hur upplever du köerna på dom attraktionerna?
- Känner du till konceptet "Virtuella köer"?
    - Om ja, vad var din uppfattning av dom?
    - Om inte, *berätta för deltagaren alternativt låt dom förklara vad dom tror att det är*
- Vilka fördelar och nackdelar tror du det finns med virtuella köer på Liseberg?
- Om möjligheten hade funnits, hade du använt virtuella köer under ditt besök?
    - Vilka attraktioner hade du helst ställt dig i virtuella köer till på Liseberg
        - Varför valde du dessa attraktioner?
        - Vad hade du gjort under tiden som du står i en virtuell kö?
- Hur ställer du dig till virtuella köer begränsade till vissa besökare?
    - Hur hade det känts som vissa gäster kunde betala extra för att få tillgång till virtuella köer?

Få ut mer av ditt besök

Mål: Ta reda på :

- Vad gäster har för uppskattning kring köer vid olika säsonger
- Vad gäster tror de gröna dagarna betyder och ifall de använder sig av dem i dagsläget
- Om mer information (snitt/total/exempel-kötid, antal besökare, snittmängd attraktioner man hinner åka, väder etc) skulle påverka hur de väljer besökstid

- Undersöka relationen mellan förväntningar och accepterad upplevd kötid

Intervju:

- När, under sommarsäsongen, brukar du besöka Liseberg? Vilka veckor och veckodagar är alternativ för dig när du bestämmer dig för besök?
- Vilka faktorer avgör för dig när du har möjlighet att besöka Liseberg?
- Känner du till de "gröna dagarna" har du använt dig av dem någon gång?
    - Upplevde du att de var korrekta? Hur kände du när de var/inte var korrekta?
- Hur mycket tror du kötiden skiljer sig från lågsäsong till högsäsong på populära attraktioner?
- Besöker du Liseberg spontant eller planerar du ditt besök?
- Om du har bestämt dig för att gå på Liseberg till helgen, och de berättar för dig att det i snitt kommer vara 20 minuter kortare kö på de stora attraktionerna om du går på måndag istället för på lördag, hur skulle det påverka ditt beslut?
- Samma fråga fast v. 25 istället för v. 31

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PUGH Matrix

	Finalised list of requirements	Weighting (1-5)	Concept 1: Personalized information	Concept 2: On demand rider	Concept 3: Virtual queues	~~Concept 4: Pay after visit~~
1	prevent feelings as boredome, uncertanty, restlessness and lack of motivations for guests standing in queues	4	0	0	1	
2	Reduce the objective waiting time at **attractions** for a guest	4	1	1	1	
3	Reduce the perceived waiting time at **attractions** for a guest	5	0	1	1	
4	Reduce the objective waiting time at the **entrance** for a guest	2	1	1	0	
5	Reduce the perceived waiting time at **entrance** for a guest	3	0	0	0	
6	utilize or facilitate situations and events that increase the guests motivation to queue (e.g novelty)	2	0	0	1	
7	Make guests feel they get value from the bought tickets independent on current guest intensity and total amount of queueing time	4	0	1	1	
8	Allow the queueing to be filled with meaningful time	4	0	0	1	
9	Validate quality and attract guests to the park	1	1	0	0	
10	Validate quality and attract guests to individual attractions	2	0	0	0	
11	be applied without decreasing the ability for customer to consume at the park	4	1	1	1	
12	Be applied at Liseberg without substantially increasing crowding throughout the park	3	1	1	−1	
13	work in co-existance with lisebergs current physical queueing systems, expresspass system and single rider system (or replace)	5	1	1	1	
14	Allow services throughout the park to work at full capacity	4	0	0	0	
15	give Liseberg the ability to provide accurate estimations of waiting time at attractions	3	0	0	0	
16	give Liseberg the ability to provide accurate estimations of waiting time at the entrance	2	0	0	0	
17	Guide guests in decision making regarding when to visit the park, based on factors as weather and guest intensity	5	1	0	0	
18	Allow guests to attain information about estimated amount of park guests (including different weekdays, weeks and seasons)	5	1	0	0	
19	Allow guests to attain information about park opening hours	3	1	0	0	
20	Allow guests to pre-buy entrance and tickets	3	0	1	0	
21	Communicates queue passing opportunities efficiant to guests	2	0	1	1	
22	Create a more even distribution of guest visits across seasons	5	1	1	0	
23	Create a more even distribution of guest visits across weekdays	4	1	1	0	
24	Create a more even distribution of time spent in park across seasons (reducing time spent at park during peak season and increasing during low season)	4	0	1	0	
25	Create a more even distribution of time spent in park across weekdays (reducing time spent at park during peak days and increasing during low intensity days)	3	0	1	0	
26	Create a more even distribution of guests across attractions	4	0	0	0	
27	Function properly under varied and changing physical conditions (e.g weather)	4	1	1	1	
28	Prevent eventual complaints from guests regarding ticket price and queue time towards employees	2	1	0	0	
29	Enable guests to have a accurate conceptual model of how the lines work at the attractions	3	0	−1	−1	
30	Enable guests to have a accurate conceptual model of how the lines work at the entrance	4	0	0	0	
31	Guide guests to the most efficiant entrance alternative (for the guest herself, all other guests and employees) based on the guests ticket situation	4	0	1	0	

	Finalised list of requirements	Weighting (1-5)	Concept 1: Personalized information	Concept 2: On demand rider	Concept 3: Virtual queues	~~Concept 4: Pay after visit~~
32	Help users to make informed decisions inside the park to avoid long waiting times	5	1	0	1	
33	reduce the amount of perceived physical discomfort for a guest	3	0	0	1	
34	facilitate positive **employee** to **employee** interactions	3	0	0	0	
35	facilitate positive **employee** to **guest** interactions	4	0	0	0	
36	facilitate positive **guest** to **guest** interactions (inside groups)	5	0	0	1	
37	facilitate positive **guest** to **guest** interactions (between groups)	1	0	0	0	
38	Enable guests to keep track of family or group members inside the park	4	0	0	0	
39	Be adapted to handling groups of guests (not only indivisuals)	4	0	0	0	
40	help guests make a decision about what ticket they want (thats optimal for their prefered experience) before arriving at the register	3	0	1	0	
41	allow employees to effectivly deal with breakdowns	2	0	0	1	
42	guide the guest in the event of delays	3	0	0	1	
43	Help the guest feel compensated in situations where they feel invested time or money are not giving enough value back	3	0	0	1	
44	Efficent for employees to get started with, and use during shorter intervals when working at attractions	3	0	0	0	
45	Be applied without introducing paid-, or other unfair advantages to specific guests	5	1	1	1	
46	stimulate and help the employees with their daily tasks to a level where the employees feel they are occupied to a comfortable degree	2	0	0	0	
47	Co-exist and/or develop further alongside Lisebergs future mobile application as well as other digital services	5	1	1	1	
48	Allow the guests to use the most convinient payment solution to pay for a service	4	0	1	0	
49	Allow visitors and employees to feel and be safe, as well as react to risky situations	2	0	0	0	
50	Allow Liseberg and its employees to handle scamming, or other attempts to avoid paying for services	4	0	0	0	
51	facilitate employees in completing their work tasks efficently without increasing their stress	4	0	0	0	
52	be justifiable from an economical business perspective	5	1	1	1	
53	not demand the guest to use a smart phone to access the service	3	1	−1	−1	
	Sum		**70**	**72**	**65**	

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Usability test material

Questionnaire before usability test:

Test person number:
Age:
Occupation:

Have you ever been to Liseberg, during the summer searson, before?

If yes, when was the last time and what did you do there?

Are you confident using smartphones and applications?

Do you know what a "Virtuell kö" (Virtual queue) is? Please write a description of your interpretation of the words:

Test Scenarios

Vi gör vårt examensarbete och utvecklar i samband med det en app, vilken är den vi ska testa idag. Det är viktigt att du vet att detta testet inte fokuserar på din skicklighet, utan endast på att utvärdera själva produkten. Du kommer få ett par frågor och ett scenario som beskriver en uppgift du ska utföra. Känner du att det är någonting du inte vill göra eller svara på så är det bara att säga till, så behöver du såklart inte det! Testet registreras helt anonymt. Vi kommer också filma testet (om det är okej?), men det är bara för vår egna skull och kommer inte visas för någon utomstående. Tänk gärna högt när du utför uppgifterna så vi vet hur du tänker och resonerar. Kom ihåg att det vi testar idag bara är en prototyp, så vissa knappar kommer t.ex. inte att fungera korrekt.

Intro:
Idag kommer du att få ett tillfälligt namn: Helena Stening. Du, och ditt barn Felix Franzén, har precis kommit fram till Liseberg och är exalterade över en heldag i parken. Du har redan köpt entré, online sedan tidigare, och registrerade dig för ett Lisebergskonto och fick då också boka in en expresspass-tid på köpet, och du har skrivit upp att ni bokade 14:30-15:00 på Helix.

Stödfrågor:
Hur skulle du gå tillväga för att komma igång?
Beskriv vad du ser på skärmen
Vad tror du man kan göra från denna sidan?
Vad hade du gjort på denna sidan?

1. Onboarding: Register wristband + create company

Du fick också ett tips om att om du laddar ner Lisebergs nya app, så kommer du kunna använda Virtuella köer, dvs. att slippa fysiskt stå i kö och köa via appen till vissa attraktioner. Du har därför precis laddat ner appen och möts av denna skärm:
Förklara gärna hur du tänker innan du klickar på någonting
Undersök: Förstår testpersonen..

- värdet med att scanna sina armband?
- att det är QR koden på armbandet som ska scannas?
- att man kan lägga till sitt sällskaps QR-kod
- kopplar personen att express-passet som ligger i appen är det som hen bokade online innan?

2. Join a virtual queue for attractions, alone or with persons from the group
Felix säger att han vill åka Atmosfear. Du tycker det låter som en bra idé och åker den gärna också. Du ser på en skylt att kön är rätt lång, och bestämmer dig för att använda appen till att boka en plats för dig och Felix.
Undersök: Förstår testpersonen..

- hur man bokar en köplats?
- att man kan avmarkera personer som inte ska åka med?
- att uppgiften är avklarad när hen har bokat (ser den att AtmosFear har tillkommit i listan med köer)?

3. Check status on current Virtual queues (and booked express pass) for group members
Ni går och åker en attraktion som har mindre kötid. När ni är klara börjar du fundera på hur det var med den virtuella kön. När var det ni skulle åka nu igen?
Undersök: Förstår testpersonen..

- att både expresspass & virtuella köer är samlade i en lista?
- hur lång tid det är kvar tills hen måste vara på attraktionen?

Follow up interview

- What is your overall opinion of the virtual queuing app?
- What was hard to understand?
- What was easy to understand?
- Was the app different or similar to your expectations of a virtual queueing application?
- What kind of benefits or problems to you think a virtual queueing service creates at Liseberg?
- Who do you know that would like to use virtual queueing? What are they like?